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EDITORIAL NOTES.

Labour Questions in the Coalfields.

THE prospects of peace in the coalfields of Great Britain cannot be said to have been improved by the report of the proceedings at the special conference of the Miners' Federation, which met recently at Southport "to consider the eight "hours question." It will be remembered that at a previous meeting of the Federation proposals were made that, as, so far, the Eight Hours in Coal Mines Bill had failed to receive the sanction of Parliament, the men should proceed to obtain the eight hours day by means of a strike, if the collieries would not grant it without. Nothing has up to the present been done by way of putting such a policy into force, and the proposal has been regarded rather as an attempt to bluff Parliament into giving more favourable consideration to the Bill. The Southport conference, however, revives the proposal, and brings the adoption of the policy more within the sphere of possibilities—the proceedings being conducted by the head officials of the Federation and attended by a full muster of local delegates. According to an official report furnished to the Press, the conference recommends the miners within the Federation area to consider whether "Trades "Union means" should not now be taken to secure an eight hours day "from bank to bank," seeing that the Government will not enact a legal eight hours day, and that the coalowners urge on every occasion that the desired object should be attained, if at all, by Trade Union efforts. A ballot of the miners is to be taken before the annual conference in October, as to whether "legal or Trade Union "effort" be used to obtain an eight hour day, the officials in the meantime making an attempt to effect a settlement of the question by negotiation with the owners. ("By legal effort or by Trade Union effort" might be described as an unconsciously truthful distinction.) It was further determined that at the annual conference in October it shall be decided "whether notices shall be given, and, if so, on what "date such Trade Union effort shall be put into force," by which resolution "Trade Union effort" is candidly admitted to mean neither more nor less than a strike.

It remains to be seen whether the men endorse the views of the leaders—the probabilities being that they will, seeing how displeased they are with the reduction in wages—and whether, if they do, and the owners decline to reduce the hours of work as desired, the policy will be carried through to the bitter end. For ourselves, we doubt whether, if it comes to the pinch, the men are really sufficiently keen upon the eight hours day to make that the sole ground for a strike. But it may be used as the ostensible cause, when the actual source of trouble is the question of wages. The latter question, if the "Sheffield Independent" be correctly informed, will assume a very acute form at the end of next year. According to our contemporary, the notice given by the South Wales miners, to terminate the sliding-scale agreement, is part of a larger scheme of policy on the wages question to be adopted throughout the Federation area in Great Britain. The present wages agreement in the Federated coalfields in England and North Wales, and the Conciliation Board agreement in the federated area in Scotland, both expire at the end of 1903; and it is proposed that, when that time comes, a new Conciliation Board should be formed to regulate wages (within maximum and minimum rates higher than those now in operation) throughout Great Britian—with the possible exception of Northumberland and Durham, which are at present outside the Federation. The "Sheffield Independent" describes this scheme as "the boldest proposal which has been made for the effective "combination of labour and capital," and remarks that "its "prospective advantages to coalowners and miners are un-"mistakable." Whether the coalowners who have to contend with competition in foreign markets will endorse the statement is decidedly open to doubt. As we have said, the omens are not just now strikingly favourable to an indefinite continuance of peace between miner and mine owner.

The Question of the Value of Residuals.

THE everlasting question of industrial economics is the relative importance of the primary product and the contingent contributaries to the profits of the undertaking. There is no single-term solution of the problem that can be prescribed as of universal validity. It follows from this openness of the question that from time to time enterprising people get committed to essay the familiar but tedious and painful method of "trial and error" for answering it in regard to some particular application. The origin of all such attempts is to be found in the confusion of judgment that occasionally, and very pardonably, arises in some minds over the working results of certain undertakings, when the revenue account shows that incidental gains have more than paid for the first cost of the raw material. This has been exhibited again and again in the gas industry, which happens to be a manufacturing business producing a principal, and several subsidiary commodities. The object for which the industry is carried on is the manufacture and distribution of illuminating gas. It is a mere accident of the necessary process, when the once essential and still most largely employed raw material, coal, is used, that there is a concomitant production of other valuable articles besides gas—coke and liquid residuals—which at particular times and under certain circumstances have repaid the whole cost of the coal, and always repay a large proportion of it. This need not be the case; and, in fact, gas can be, and is, largely made from oil, without leaving any residual of value sufficient to repay more than a small and negligible fraction of the cost of the raw material. Yet from the fact above stated, of the value of coal gas residuals having been known to pay for the coal carbonized, all sorts of fallacious inferences have been drawn. The assertion that gas supply undertakers get so much for their residuals that they ought to distribute their gas for nothing, was one of them. It is just such a sample of economic heresy as might be depended upon to catch the popular fancy; and accordingly the kind of intelligence that, in spite of Board Schools, still remains incapable of understanding how gas profits are made, and entertains a rooted distrust of the harmless, necessary consumer's gas-meter, is easily deluded by it.

The determination of the real object for which any trading undertaking is carried on should not be difficult. It is easy to ascertain what is the focus of the undertaking, beyond which everything else is incidental and subsidiary. We have frequently discussed this subject in these columns; showing how the focus of the major interest in the products of the carbonization of coal may be shifted in particular circumstances from one product, or class of products, to another. There cannot be more than one focus in any case. A choice of one reduces every other consideration to comparative insignificance; because the business has to be carried on for the one object, which it is intended shall be its support. All other gains are therefore merely economies, which may indeed reduce the cost of carrying on the business, but cannot of themselves make it profitable. An extreme illustration of this observation may be found in the traffic in postage stamps. Some examples of stamps command such prices, that it has been jocularly proposed to run certain obscure principalities for the sake of their stamp issues. The analogy is perhaps not quite perfect; but it will serve, within limits, to exhibit the confusion of judgment which leads to the conclusion that an incidental gain can ever be relied upon to support another undertaking.

It is perfectly true, though the popular mind cannot be expected to perceive it, that the conduct of any business which, like the gas industry, is much affected by its incidentals—in this case called residuals—is made far more troublesome and worrying to those who are responsible for its success, by these selfsame subjects of consideration. The administration of the gas industry would be a great deal easier without them. They have come to exercise the minds and disturb the calculations of gas managers whose forefathers in the trade knew nothing of them, and yet returned very respectable dividends. The carburetted water-gas branch of the industry in the United States has no

residuals trade; and it is better without it. The obligation to make the utmost of his residuals, and the knowledge that the making of both ends meet depends upon his ability to do so, is one of the heaviest cares of the modern British gas manager; and it is a charge that he bears far more in the interests of the public than for the benefit of his employers. He finds himself, year after year, with a narrower margin of possible profit. He has to pinch and grind on the expenditure side, in order that no reproach of inferior husbandry may rest upon his reputation. This, of course, is only the common experience of managers of industrial and commercial concerns. Every shilling that they can save by cutting down expenses, is as much an incidental of the profitable working of the business as if they discovered and realized a "residual" of equal value. Nobody, however, is quite so foolish as to propose to start a business solely with the object of effecting a saving on the usual allowance for bad debts. Yet even this idea is not really more idiotic than the quite common notion that a gas undertaking can be run upon its residuals.

The modern British gas manager has come to find his net cost of coals prescribed for him by what has been previously done with the residuals. It was the "new fact" of the last coal market inflation, that the value of the residuals of gas manufacture failed to rise commensurately with the price of coal. Of course, the public are in profound ignorance of this fact. What they do hear, indeed, of the wonderful development of the German coal tar products trade, from the fervid orations of professors of chemistry who want financial assistance for their classes, leads them to believe that the gas companies must be making piles of money by reason of the progress of chemical science. There is the further idea abroad, also, that sulphate of ammonia must be a gold mine to the ordinary gas-works, if it is true that a number of notable people in the Midlands are able to offer "power" gas at 2d. per 1000 cubic feet, because they hope to get so much profit out of the recovery of the ammonia from it. In face of all this, it is in vain for the gas manager to explain that the gas consumers already get all the benefit there is in the return from residuals—that this set-off to the cost of coal is discounted, by use and wont, in fixing the selling price of gas; and that it does not tend to increase.

The case of the most valuable residual of all—coke—is bad enough. Small gas companies in isolated places get a good price for it; but, on the other hand, the price of their gas is usually so high for other reasons that the public do not feel any relief on this account. Moreover, the local coal retailers are always watching the trade, and lying in wait for such profit as they can hope for from disposing of a truck or a barge load of imported coke. There is only too free a trade in coke to please small producers. When two gas managers meet, the probability is that their talk will turn upon coke before it is ended; and very pointed some of it is sure to be. If there is anything that vexes the small maker more than the invasion of his territory by coke from some big works at a distance, it is the obligation that rests upon the large producer to get rid of his embarrassment of coke at any price. Matters will not be improved by the recent innovation in the English portland cement manufacture, which consists in the adoption of rotary kilns fired with small coal. It is offered as one of the inducements of this new process that it renders the manufacturer independent of gas companies. So there is another residual gone wrong, from the producer's point of view. And if the latest rumour should prove to be well founded, and crude petroleum be susceptible of distillation after a fashion to make it yield products identical with those of coal tar, there will be a further falling off of the incidental profits of gas manufacture. Hence the value of residuals to the gas industry, so far from being enhanced by the advance of chemical science and other causes, is actually being depreciated, and is likely to bulk smaller rather than larger in the future as an aid to the cheapening of gas.

The Welsbach Report.

It may be fully anticipated that the friends of the late Board of Directors of the Welsbach Company will make the most of the poor report which it is the unfortunate lot of the new Directors of the concern to have to issue; but it will be an easy matter for the present Board, if anyone seeks to defame their management on this report, for them to silence their criticism. The old Directors were only sent about their business by the shareholders some five months or so since; and then came the interregnum which was spread over three or more weeks, during which period the Advisory Committee were not sparing themselves in setting the Welsbach house in order, and providing for the future conduct of the affairs of the Company. While all this was going on, the policy of the old Board was, by the force of circumstances, being continued. Therefore, the present report is almost, if not entirely, the fruit of the condemned direction of the past; and we are afraid that some time must elapse before the influence of what has been is entirely wiped out. There is a frankness about the report which stamps it as an honest statement; and it vividly shows what a terrible burden the new management have taken upon themselves. But it is manifest that they are facing the position boldly; and that is the only way in which such a deplorable position could be faced with any hope of at all effectually dealing with it. They have devoted large sums to meet insufficient depreciation of stock in former years, and to providing a suspense fund to meet losses arising out of engagements contracted in previous years. These and other losses which are part and parcel of their legacy, have necessarily trenched to a substantial extent upon the profits, and left the net profit at under £24,000. It is pleasing, however, to learn that—despite the attempt of the old Directors to give the shareholders a fright as to the serious effect which the intervention of the Advisory Committee would have upon the trading—the trade of the year under review discloses an increase upon that of the preceding year. The Directors have wisely decided not to put forward any definite recommendation as to the reduction of the capital until a better estimate can be made of the probable earnings of the Company under the new conditions. Though there is to be this delay, the best friends of the Company recognize that a reduction is inevitable, and the sooner it can be prudently consummated, the better will it be for all concerned. We congratulate the new Board on the evidence which the report gives of the firmness of their intention to grapple in the thorough manner authorized by the shareholders with what at one time appeared to be an almost hopeless situation.

Municipal Trading and Municipal Loans.

To use an Irish figure of speech, the chief interest of these editorial notes upon the gas industry centres this week in the "Electric Lighting Memoranda," wherein particular attention is called to the proceedings noticed in our "Parliamentary Intelligence" last week, where the South Metropolitan Gas Company succeeded in getting a municipal trading undertaking placed under orders to charge a self-supporting price for electricity. This victory for fair dealing and honest book-keeping was won at a moment when the subject of local authorities' loans and their repayment had again cropped up in the papers, as part of the general problem of local government finance, which is bound to increase in importance with the passing years. The report of the Select Committee of the House of Commons appointed to consider the subject of the period of repayment of local authorities' loans has been issued, and it usefully condenses the available information on this matter that has been floating in the atmosphere of Government offices and town halls. The report starts with the fact that Parliament now requires all local loans to be repaid within a limited number of years—varying from 10 to 60 years in England and Wales. The Local Government Board, which is charged with the general supervision of local finance, in fixing the redemption period, takes into consideration the probable future condition of the localities with regard to debt, and not merely the probable useful life of the undertaking on which the money is to be spent. By a Standing Order of 1882, the maximum period for a loan obtained under a Private Bill is fixed at 60 years. The Committee were called upon to consider the growth of local indebtedness due to what they preferred to call reproductive work, but which is commonly styled municipal trading. The Committee prudently voted themselves excluded by the terms of the reference from considering whether, in point of fact, such work generally produces pecuniary profit. They did, however, have the curiosity to inquire whether adequate provision is usually made for the repairs or depreciation of works made with borrowed money; and they found that this is not done.

Subject to the proviso that proper depreciation allowances should be made, and also that the sanctioning authority

should have power to fix the method of repayment, the Committee consider that the caution at present exercised with regard to the period for repayment might be to some extent relaxed. It should no longer be possible for local authorities to obtain from Parliament, by means of a Bill, easier terms than they could expect from a Government Department. The Committee are of opinion that the promotion of mere Money Bills by local authorities should be discouraged, and the authorities left to deal directly with the departments which know their history and circumstances. Additional light has been shed upon this recommendation by the publication of the recent history of municipal appeals to the Money Market. The price which those local authorities who are the most frequent borrowers have had to pay for their latest loans is the best of all commentaries upon the delusion, which is industriously fostered by municipalizers, that such bodies can always get capital cheaper than companies. This has invariably been one of the stock arguments for municipalization. But it has almost been cut away by the progressive rise in the price of loans to those local authorities which are deeply committed to so-called reproductive ventures. Speaking generally, it may be said, with very fair approximation to the truth, that the non-trading municipalities can borrow money at considerably lower rates than those which have most industrial activity. There can be nothing else, of equally general application, to explain why one city can place a 3 per cent. loan at par, while another locality can only get it out at 92. One active town has had to issue 4 per cent. debentures at par. The moral of all this is obvious. It is quite true that money can be borrowed on the security of city rates, for city government purposes only, cheaper than a company can usually obtain it. But when the city has assumed the status, and submitted to the risks, of a trader, it has to pay the corresponding rate for the capital required to carry on its enterprises. There is no apparent escape from this conclusion; and it is fatal to one of the best-esteemed pleas for municipal trading.

The Shop Clubs Bill.

The Shop Clubs Bill came before the House of Lords for consideration last week, and was accorded a second reading by a majority of 78 to 17. Lord Wemyss, who opposed the Bill, quoted, in support of his opposition, "a resolution, "passed he believed that day by the Employers' Parlia- "mentary Council, on the motion of Sir George Livesey, "expressing the view that the Bill would tend to dis- "courage thrift, to do away with a source of friendly rela- "tions between employers and employed, and to affect "seriously the question of freedom of contract." Presuming Lord Wemyss to have been correctly informed and properly reported, we find some difficulty in reconciling the resolution of the Employers' Council with the objects of the Bill, or with Sir George Livesey's letter of the 8th inst. to "The Times." The Bill is not intended to destroy Shop Clubs, which, as Sir George says, are, when jointly supported by employers and workmen, a great advantage to both, promoting friendly relations and rendering great assistance to workmen when they most need help. The Bill is intended to prevent workmen from being compelled, as a condition of employment, to join shop clubs and to discontinue membership of other friendly societies; exception being made in favour of shop clubs registered under the Friendly Society Acts and certified by the Registrar to be such clubs as might rightly be exempt. Sir George, in his letter, says: "Membership should not be made a condition of employ- "ment. Were I a workman, I should strongly resent any- "thing in the nature of compulsion; but for compulsion "there should be no need. Further, there should be no pro- "hibition of membership of friendly societies. . . This "Company will keep clear of the new Act by not registering "its various clubs, and will thus maintain the perfect freedom "for employers and employed that has hitherto existed." But, as we understand the case, there will be no need at all for the South Metropolitan Company to "keep clear of the "new Act," for the new Act will itself keep clear of their clubs, and the clubs of every other employer, whether such clubs be registered or not, so long as the terms of employment do not make membership of the clubs compulsory. The Bill, in fact, carries out Sir George Livesey's views—namely, objection to compulsion and to prohibition of plural membership. Hence we are somewhat mystified by the resolution quoted by Lord Wemyss. Injury to "freedom "of contract" involved by the Bill is, we think, much more imaginary than real—certainly not more than that done by the Truck Acts; and the facts that led to the passing of those Acts proved that a man with an empty stomach is not always a "free agent" in anything but theory when offered employment upon conditions. We should say that there is more real interference with liberty in an employer compelling his employees to join the shop club, than in the law saying that the employer shall only exercise that compulsion on condition that the club fulfils certain requirements as regards its constitution.

An Electrical Engineer on Public Lighting.

The report by the Borough Electrical Engineer on the public lighting of Plymouth, a full abstract of which is given elsewhere, is interesting so far as it goes. Mr. Okell does not appear to have been anxious to magnify the claims of the electrical section of this portion of his work; and, except for one sentence in which he claims that the adoption of arc lights greatly improved the lighting of the Hoe and some of the central thoroughfares, his report is free from any attempt to magnify one system of illumination more than another. Seeing that practically all his interests are bound up in the electrical undertaking which he controls, and that gas has naturally a very secondary place in his regard, this apparent absence of bias is greatly to his credit. At the same time, we should have been glad if his statement could have been carried a little farther. Useful as it is for purposes of comparison between the new and old systems of lighting, it would have been more so if it had been made a complete record of actual costs. As regards arc lights, for example, it appears that 72 were actually installed in 1898. The number, we believe, remains unchanged; but Mr. Okell brings into his comparative table only 58—the remaining 14 being ignored because they are on the Hoe, and the cost is charged to the Hoe and Recreation Grounds Committee instead of to the street lighting account. Certain gas-lamps, chargeable to the Sanitary Committee and other departments, though they really form part of the scheme of public lighting, are not counted for the same reason. These omissions detract from the value of the financial statement, and at the same time seriously lessen the nominal candle power which is claimed under the modern system. Mr. Okell's table of comparative costs of systems of lighting would have been more interesting if he had added another column, stating what would have been the cost of lighting the whole town by incandescent gas. There are 78 miles of streets in Plymouth. Of these, some two or three miles are lighted by 58 electric arc lamps at a cost of £1224 per annum. The remaining 75 or 76 miles are lighted by incandescent gas-lamps, at a charge last year of about £4700. It is hardly fair to say that gas cost £63 per mile as against £400 or £500 per mile for electric arc lights, because some allowance must be made for the difference in the amount of light which the centre of the town and the suburbs receive, or are supposed to receive. A more correct method would be to estimate, on the basis of the ascertained experience of incandescent lighting, what it would cost to effectively illuminate the thoroughfares now lighted by electricity, and to place this in comparison with the present expenditure of £1224. This, however, would be to make rather large demands upon an Electrical Engineer, though it is possible that the result might astonish some of the members of the Committee who have charge of the electricity works and the street lighting of Plymouth.

Increased Gas Bills Again.

Following the good example set at Salford (which was referred to last week), Mr. Alderman Gibson, the Chairman of the Manchester Corporation Gas Committee, has been giving some information with regard to the prevalent complaints of increased gas bills. His clear statement on the subject should have the effect of bringing dissatisfied consumers to their senses, though even at the present time, it is to be noted, the complaints do not amount to more than eight per thousand, which, however, in its turn, is double the usual number. Shortly, Alderman Gibson lays all the blame on the weather, just as did Alderman Phillips, of Salford; and there cannot be the slightest doubt that this is the correct explanation of the matter. But, unfortunately, the weather is so often unjustly made the scapegoat when things go at all wrong, that on this occasion, when the responsibility

for the trouble can be fairly laid at its door, there will doubtless be found people who will wish to seek farther for an explanation. The idea that the pressure has been unduly increased, is put entirely out of court by the publication of the facts that on many occasions the city has been within a few hours of total darkness, and that the leakage from the mains continues at the normal rate. Several other superstitions were also severely dealt with by the Alderman—for instance, the assertions that air was pumped into the mains, and that there was some difference in the registration by the meters of carburetted water gas and coal gas. One member absolutely put the London County Council's wheelbarrow photometer proposal into the shade, by suggesting that a small gasholder, of about 10 cubic feet capacity, should be taken to the houses of dissatisfied consumers, so that the meter could be tested by allowing the gas to flow through it. Of course, one does not expect all town councillors to be experts in gas matters; but it is hard to understand how a reasonable man could urge that such an arrangement as this would be preferable to having the meters tested as they are at present by independent persons under the control of the City Magistrates. Consumers who believe they have been overcharged can always have their meters examined. But the difficulty is that they are obliged to "back" their opinion—that is to say, if they are wrong and the meter is right, the consumers have to pay the expense of testing. While, therefore, it costs nothing to complain and to write indignant letters to the Press, there may be some outlay attached to the process of arriving at the truth of the matter; and this would not at all suit the grumblers. It seems almost a pity that the Gas Committee, instead of, as at present, giving complaining consumers the option of having their meters examined, should not be able to compel them to do so, on the conditions above referred to. This would probably soon bring the complaints down again to their accustomed proportion—or even less.

The Betterment of London.

THERE has been a voluminous, and, in parts, an amusing newspaper correspondence respecting the latest Society formed by Sir W. B. Richmond, which claims to aim at the "Betterment of London." The first thing that strikes one, in regard to this movement is the use made of a word which for some years has been otherwise employed. "Betterment" has been a war-cry of those who held that ground landlords should be chargeable with part of the cost of town improvements; and the London County Council spent years and thousands of pounds in getting parliamentary sanction to the application of the principle in a very small and tentative way. One almost wonders if Sir W. B. Richmond paid the County Council anything for a licence to use the word. Of course not; because he puts a totally different meaning upon it. Still, another might have served the turn equally well. It is sufficiently obvious why the word "improve-" ment" was not selected. This word has received a quite technical signification in connection with the terminology of local government, and has accordingly lost its original meaning. The general smartening and cleaning up of the town seems to constitute the chief part of the programme of the new Association; and it cannot be gainsaid that the enterprise is called for. The amount of good that will be done by the fresh organization, however, will chiefly depend on the hands which will control it. The municipal officials and their chiefs, the Gas Companies, and the Water Companies, ought to be brought into it, if business is really meant. Any number of amateurs of reform, who do not know how much work goes to keep London as clean and habitable as it is, must fail to carry an improvement in any particular. On the other hand, those who are regularly occupied in the work are apt to get into ruts, from which the spur of an enlightened public opinion is needed to extricate them. These things call for combined effort, which is very difficult indeed to organize.

Meanwhile, Sir W. B. Richmond's Coal Smoke Abatement Society is reported to be going strong. The President has written to the newspapers offering assistance to "per-" sons annoyed with smoke from factories, workshops, " bakeries, and clubs or hotel chimneys, as to the means " of procuring abatement of the nuisance." It looks as if this catalogue of possible offenders included some who might claim exemption; but, in any case, it does not apply to anybody who could not be made quite safe by having recourse to gas as fuel. Proceedings under the law of public health take time; and meanwhile those who feel their position insecure might confer with the officers of the Gas Company with a view to learning how they could be enabled to snap their fingers at Sir W. B. Richmond's Societies. The question for the moment is, as we put it the other day in connection with a similar matter: Who is to move? If the capabilities of gas for doing the work of hotels and clubs, as well as of residential "flats" and office buildings, were only utilized in London in the degree already attained in some places that could be named, Sir W. B. Richmond might safely return to his own proper occupation of painter and decorator.

Justice before Generosity at South Shields.

Notwithstanding the protest of the South Shields Gas Company against the action of the Corporation in granting a free supply of electric current to new consumers during the months of May, June, and July (to which reference was made in the "JOURNAL" for the 10th ult.), the Electricity Committee are not showing the slightest inclination to withdraw their tempting offer, which, it appears, has already brought a considerable accession of customers to the department, and many more are expected to come in before the close of the month. If the Committee show firmness in persisting in the course they have adopted, the Company are no less determined to follow theirs; and, a few days ago, they applied, through their Solicitor, for permission to examine the books, to ascertain exactly how far the offer had been accepted. The Committee, however, politely declined to grant it. If by so doing they thought to stifle opposition, they were mistaken, for the Company are not alone in their objection to this extraordinary liberality on the part of the Corporation; a letter having been received by the Committee from a Solicitor in the borough, protesting, as a consumer of long standing, against the granting to new-comers of privileges which have never been extended to the original or subsequent customers of the department. Moreover, he naturally fails to see why, as a ratepayer, he should have to bear the cost of the electric energy which the Corporation think fit to give away. In the event of the gratuitous supply being received by a new consumer, he means to decline to pay his next quarter's account, in order to test the legality of the whole proceeding. The Town Clerk simply acknowledged the letter. There are consequently in South Shields the elements of a "pretty little quarrel," the development of which will be watched with interest.

The Value of Label Guarantees.

There is no occasion to comment on the case of *Robertson v. General Incandescent Company, Limited*, which is reported in another column; but attention may be called to it as it deals with the point as to the value of printed guarantees against litigation loss in connection with the use of mantles other than those legitimately vended. The case shows that a user of guaranteed mantles is able to recover from the guarantors any expenses incurred in litigation in connection with such use. Purchasers of mantles other than the Welsbach will therefore do well to defend themselves by seeing that the label of the boxes containing the mantles expressly states that the vendors are licensed to sell them, or that the label specifically indemnifies the user. It may be mentioned that the defendants in the case referred to now hold the Welsbach Company's licence.

Shifting Lamp-Column Arms.

We report in another portion of to-day's issue a case heard at the recent Hants County Assizes, in which a painter claimed damages from the Aldershot Urban District Council for injuries sustained while painting a lamp-column. The case was an important one to the Council directly concerned (the amount claimed being no less than £500), and it is also of importance to other gas companies and local authorities who are responsible for public lighting; for a precisely similar set of circumstances might arise in other places. The plaintiff was in the employ of a man who had contracted to paint for the District Council lamps originally fixed by the Aldershot Gas and Water Company; and his case was that, while working on this job, the arm of one of the lamp-columns moved, and allowed his ladder

(which was resting against the arm) to fall, and thus cause the injuries complained of. His Counsel, however, had so many difficulties to overcome, that it is hardly surprising he failed to secure a verdict. First of all, there was the question of whether, even supposing all the facts to be as stated, the right people were being sued, inasmuch as the plaintiff was not in the employ of the District Council; then contributory negligence was alleged, and it was contended that the plaintiff should not have made use of the arm at all; and, lastly, it was urged that, if the arm did move, it did not do so to an extent sufficient to cause the ladder to fall. The point with regard to the matter which we wish to emphasize is that it was apparently not argued on behalf of the defendants that under no circumstances could it have been possible for the arm to swing round; and therefore there is a moral to be drawn from the case—as, indeed, there generally is from the misfortunes of individuals. From time to time one hears of accidents arising to lamp-cleaners, &c., from the slipping of these arms; and surely it should be practicable in some way or another to render such occurrences impossible. Public lighting authorities should insist upon the arms being fixed to lamp-columns in such a manner as to be absolutely immovable by ordinary usage. This will be the surest method of protecting themselves against such actions as that brought against the Aldershot Urban District Council.

Wanted, a Cheap and Respectable Burner.

There are now a number of cheap mantles, some of which are of excellent quality; but complaint reaches us that there is missing the second essential for making a big spurt in the incandescent mantle business among ordinary and prepayment gas consumers. What is wanted is a burner which is both cheap and decent. Of burners possessing the first merit, there are many; but among them gas managers say there is a lot of rubbish which they cannot conscientiously—and not only so, but dare not—recommend to their consumers' use. Many of these burners bear on their exteriors the character which speaks louder than words of cheapness and nastiness. Some of them have a tinsel appearance; and the finish is on, or rather below the level of goods found in the third-rate tinware shop. We were attracted by a row of such burners fitted up in a retail shop the other day, and a more hideous looking set it would be hard to find. Chimneys fitted the galleries only "where they touched;" and there was not one the chimney of which, nor the mantle, could be said to be perfectly vertical. The glasses themselves, too, were of poor quality. Now, what self-respecting manager could recommend things of this kind. Such defects would be an eyesore to most gas consumers. Complaint is also made that some of these cheap burners get out of repair quickly, and are a constant source of annoyance; and so altogether gas managers are afraid to introduce them broadcast among their consumers. On the other hand, manufacturers say that it is quite impossible to produce an incandescent burner for a few pence which shall look good and be good. At the price, they cannot afford to pay for the supervision necessary for the production of a really suitable and serviceable article. Well, then, the answer is clear: Charge a few more pence to cover proper manufacture. The makers may depend upon this, that a burner which is respectable enough to put up anywhere, which gives good lighting results, which is reasonably cheap, and which gas managers will have no hesitation in recommending, will meet an immediate requirement of the time. We have purposely omitted here any reference to actual prices, so that no manufacturer can accuse us of "slating" his particular goods. The questions are, Who is going to supply that which is needful to further popularize the incandescent mantle; or are there already burners available, but little known, of the character wanted?

More Information Wanted.

The career of the Incandescent Mantle Trust has been a stormful one. Among other things, it has been subject to division; and of the original body one does not know which part now glorifies itself under the name given to it at its birth. However, the remnant of the original is now and again heard of; but, so far as we can trace, prosperity has hung back from the doors of the concern from its very beginning. According to a circular which has been issued, those now in authority are endeavouring to strike out a new line for themselves. They wish it to be known near and far that they are prepared to undertake the supply of mantles of the very best quality "at the cheapest rate consistent with such quality—giving all shareholders and customers the benefit of the mass of evidence and information now at our disposal." The meaning of this mixture may perhaps be more apparent if it is mentioned that the "Trust is absolutely independent of the Welsbach Company, and thoroughly prepared to defend their position." It is proclaimed, furthermore, that the Trust "guarantee, by its label, all dealers and users against any action for infringement in respect of the 'I. T. L.' mantle, and will protect all shareholders holding five shares and upwards against any action for infringement in respect of any make of incandescent gas-light mantles they may deal in." It will be observed that the authors of the circular are a little bit shaky in their use of singular and plural words in referring to the Trust. Perhaps treating it as a singular body will be regarded as correct. Taking the literal meaning of one of the sentences, too, the mind is left in doubt as to whether it is the position of the Welsbach Company or that of the Trust it is intended to defend. However, the Trust are making a cheap offer; but maybe people who have money to spend will want to know who are the persons constituting the Trust, what amount of money they have at their back to carry out their promises as to defence "against" litigation, by what process they are going to guarantee shareholders and users "against" any action, and what is the nature of that "mass of evidence and information" they have at disposal. Of course, it is silly to be so inquisitive; but sometimes it is found to be a good thing to be stupid in this way.

Sugg's Incandescent Burners and Welsbach Mantles.

Inventors and others who have to do with patents know, but the knowledge may not be general, that if, on the petition of any person interested, it is proved to the Board of Trade that, by reason of the default of a patentee to grant licenses on reasonable terms, any person is prevented working or using to the best advantage an invention of which he is possessed, the Board may order the patentee to grant licenses on such terms as to the amount of royalties, security for payment or otherwise, as the Board, having regard to the nature of the invention, and the circumstances of the case, may deem just, and any such order may be enforced—if needful—by *mandamus*. Some months since, we heard that Messrs. William Sugg and Co. had petitioned the Board of Trade (under this power of the Patents, Designs, and Trade Marks Act) for a licence in respect of Welsbach mantles. The firm, as our readers are aware, hold several patents for incandescent burners—both for high and ordinary pressure; and their complaint was that, owing to the prohibitive terms imposed upon them for mantles by the Welsbach Company, they were prevented from working their own patents to the best advantage. Consequently, as negotiations were unsuccessful in procuring what was considered a fair arrangement as to price, Messrs. Sugg and Co. petitioned, as stated, for a licence on terms to the Board of Trade. The matter was referred to Mr. J. G. Butcher, K.C. But it is satisfactory to learn that he was troubled with nothing more than the preliminaries; for the Welsbach Company at this point agreed to grant what we believe they had previously disputed the petitioners' right to—a licence on the same terms as are allowed to the ordinary incandescent mantle trader under the recent settlement. The agreement has been signed and sent in; and Messrs. Sugg and Co. will now be able to manufacture mantles on their own account, or buy them from any unlicensed maker in this country, by paying ¼d. per mantle royalty, or purchase them free of royalty from licensed makers. For imported mantles the royalty will be ½d. It certainly seemed hard on the firm that they should be placed in an inferior position to other people in the lighting trade. However, "all's well that ends well;" and on this happy conclusion to a disturbing dispute between two such important parties in the gas lighting field, we congratulate them both.

The Begging System.

The "Trade Chat" in the current number of "The Ironmonger" contains a reference to the article on the above subject which appeared in the "JOURNAL" last week. Under the heading of "Keep it in the Family," the writer characterizes the case

cited at the close of the article as "the most artistic thing in cadging for presents" which has come under his notice for some time. He says: "It will be a proud moment in the senior's career when he returns thanks for a gift which will be at once a testimonial to his own secretarial excellence and to his son's—shall I say, 'assurance'? The present will, no doubt, be handed down as a precious heirloom in this family of sturdy beggars. But what if the response should be insufficient? Then truly, the father will have eaten sour grapes, and the child's teeth will be set on edge."

The Issue of Patents for the Transvaal.

It will be of interest to those who contemplate protecting inventions in that portion of South Africa which has recently come under British rule, to learn that in the "Transvaal Government Gazette" for May 9 a list was published of Patents Rules made by the Acting Commissioner of Patents at Pretoria which came into operation as from the 20th of that month. These rules contain information as to fees payable, forms to be used, applications, specifications, advertisements, register of patents, &c. A later issue of the "Gazette," dated May 17, gave the text of a proclamation amending the "Patents Proclamation," 1902, and conferring certain powers on the Legal Adviser to the Transvaal Administration in respect of the hearing of appeals from the Commissioner of Patents. This proclamation is supplemented by a Government notice giving a list of rules regulating appeals to the Legal Adviser from the Commissioner of Patents, and the practice and procedure therein. The "Gazettes" referred to can be seen by interested persons on application at the Commercial Intelligence Branch of the Board of Trade, No. 50, Parliament Street, S.W.

WATER AFFAIRS.

The Water Bill in Committee in the Commons.

THE statement made by the First Lord of the Treasury, now the Prime Minister, to the leader of the Opposition, a few days ago, that, while the Government intended to give first place to the Education Bill, time would be afforded for the consideration of the London Water Bill, was borne out last week, when the whole of Friday afternoon was occupied with the latter measure—or rather with the first few lines of it—as amended by the Joint Committee to whom it was referred. We say "the first few lines," because it will be seen, from the report which appears elsewhere to-day, that the House did not succeed, after five hours' work, in getting beyond the introductory words in the first clause. As "The Times" put it on Saturday, the members were engaged in the process known on the drill-ground as "marking "time;" and consequently, though there was much movement, there was no real progess. The reason for this was the opposition offered to the Bill, partly on its own account, but more particularly because of the course pursued by the Government in regard to it. The remarkable act of tergiversation performed by the Joint Committee in connection with the constitution of the Water Board had aroused suspicion; and honourable members wished to be enlightened as to the real reason for it. This was the point which gave rise to the first attack; and it was made by Mr. Buxton. As the Joint Committee appeared to be evenly divided on the question of the number of members it would be desirable to have upon the Board, he opened fire by moving that the House should be authorized to provide for the purchase of the water undertakings by an "existing authority," pending the further consideration, either by a Select Committee or otherwise, of the authority to be created to carry on the undertakings after purchase. This was manifestly an attempt to get the water-works, at all events for a time, into the hands of the London County Council; and the honourable member was promptly ruled out of order by the Speaker, who characterized his proposed instruction as in the nature of a destructive amendment that would raise a debate on the whole principle of the Bill.

After this decision, the Speaker left the chair, and gave place to Mr. Lowther, who at once called clause 1, dealing with the establishment of the Water Board. This brought up Captain Norton, who voiced the opinion of the Opposition, and even of some supporters of the Government, that the clause should not be proceeded with until the House had had time to read the evidence given before the Joint Committee, which had been issued only a few hours previously. This view was shared by Mr. Mellor, who was a member of Lord Llandaff's Commission. Certainly, a Blue Book of 636 pages was a formidable thing to digest and assimilate in a few hours; and there would have been much justification for the demand for time if the inquiry by the Committee had not been a public one, with reporters present to take notes of the proceedings for the general Press. But there could not have been much room for supposing members specially interested in the subject had not carefully followed the course of the inquiry, and noted its various phases. Mr. Long emphasized this point; and Captain Norton's motion to report progress was defeated.

Everything appeared to be ready for taking up the first clause, when Mr. Buxton moved to have it postponed, on the old ground that no time had been afforded to the House to become acquainted with the evidence laid before the Joint Committee, especially in regard to the constitution of the Board. Mr. Mellor supported this course, and cited, as a proof that the request was not unreasonable, the fact that the Committee had deferred the consideration of this question until the last. Mr. Bartley, as a Director of a Water Company, while greatly objecting to the postponement, regarded the proposed Board as unmanageably large, and expressed the belief that it would be a very expensive body to the ratepayers. He advocated a small paid Board. Mr. Burns at once fastened upon this remark, and emphasized it as a reason for postponement. Sir W. Houldsworth—the member of the Joint Committee who was responsible for what has been called their "vacillation"—opposed Mr. Buxton's motion, though he acknowledged the desirability of the House having an opportunity of going through the evidence. As far as his own action on the Committee was concerned, he thought he should be able to present a good case for his change of opinion. Sir William Harcourt got up a little virtuous indignation at what he endeavoured to make out was disrespectful treatment of the House; and Mr. Fletcher Moulton seemed inclined to credit the insinuation which has been pretty generally made, that the Government brought some pressure to bear upon the Committee. Mr. Long silenced opposition by pointing out that 55 out of 62 of the London members, as well as the majority of the Metropolitan Boroughs and the Urban and Rural District Councils, were supporting the Government; and in the end postponement of the clause was defeated by a majority of 62.

Further amendments were next submitted with the object of substituting the London County Council for the Board proposed in the Bill; but they were necessarily ruled out of order by the Chairman, as being outside the scope of the measure. Mr. Lough then made an attempt to constitute the Council the purchasing authority, on the ground that the new Board would be too inexperienced a body to be entrusted with this important work. The impracticability of the proposal was obvious. Under the existing conditions, the complaint has been made that united action has been quite impossible; and hence the outcry for centralization of management in a single body. Whether the controlling body should be composed of 33 or 71 members is a matter upon which there is division of opinion; but to set up two bodies to deal with the water undertakings—one to purchase and the other to administer them—would, it seems to us, be a most unjustifiable proceeding. The London County Council will be represented on the new Board, as the scheme for its constitution now stands, by ten members; and this number, as Mr. Chaplin—who, as a former President of the Local Government Board, had some experience of that body—told the House, will probably exhaust all the knowledge possessed at Spring Gardens on the London Water Question. But whether it will do so or not, the House declined, by a majority of 91, to accept Mr. Lough's amendment. Closing-time was now drawing near; and progress was reported. As stated at the outset, little was done, in the five hours occupied, towards advancing the Bill; and as there remain twenty pages of amendments to be disposed of, it looks as though the measure will not reach its final stage till the autumn session.

"Journal" Index.—The index to Volume LXXIX of the "JOURNAL" is now ready; and subscribers can have copies, post free, on application to the Publisher.

ESSAYS AND REVIEWS.

THE LAST FRENCH TECHNICAL COMMISSION.

OUR readers may remember that, in virtue of a resolution come to by the Paris Municipal Council on the 13th of July last year, a Technical Commission was nominated in the following September to study the question of the supply of gas in the city after the expiration of the Company's concession at the end of 1905, and advise the Administration of the city on all matters relating thereto.

The Commission was composed of nineteen members, with the Prefect of the Seine as President; and, as was shown by the list given in the "JOURNAL" at the time, it included several gentlemen specially qualified, by their close connection with the gas industry, to deal with the subjects to come under consideration. The names of Alavoine (since deceased), Delahaye, Deleury, Le Chatelier, Mascart, Vieille, and Violle, are well known to most of our readers; and associated with these gentlemen, on the technical side, were MM. Boreux, Lauriol, and Couderchon, all responsible in various ways for the public lighting of the city. Soon after the appointment of the Commission, M. Lauriol presented an elaborate report, which was approved by M. Boreux, who is the Inspector-General of Streets and Public Lighting, and distributed to each of the members. The consideration of this report and the various questions arising thereon formed the basis of the work of the Commission and its Technical Sub-Committee. The former had four, and the latter eight sittings; and the results of their labours are summarized in a communication to the Société Technique du Gaz en France, as was mentioned in the notice of the recent annual meeting which appeared in the "JOURNAL" for the 24th ult. In view of the fact that the Bill embodying the scheme sanctioned by the Municipal Council is now before the French Chamber of Deputies, it may be of interest to indicate the views of the Commission on the question submitted to them.

M. Lauriol's report was divided into seven parts. The first was merely a statement of the subject-matter, and a summary of the conclusions arrived at. In the second, the author discussed the advisability of the Municipal Council undertaking in 1906 the manufacture of gas, and considered the nature of the gas and the quantity required. The two succeeding parts were devoted to the details of a scheme for new works and the cost of making gas; and in the remainder the questions of the commercial value of the Gas Company's property, the proposals submitted as the basis of a new Treaty, and the municipal management of gas-works were dealt with. As already mentioned, the first part was merely a summary, and it consisted of one chapter only. The second part contained four chapters. In the first, M. Lauriol reviewed the various competitors with coal gas—electricity, acetylene, alcohol, petroleum, carburetted air, and carburetted and uncarburetted "poor" (producer) and water gas—and came to the conclusion that electricity was costly, acetylene both costly and dangerous, alcohol costly and of restricted application, and petroleum difficult of employment for incandescent lighting; while carburetted air had not been seriously applied in Paris by those who had sought authority to use it. With regard to "poor" gas, he thought the quantity of carbonic oxide contained in it constituted an element of danger; while its carburation to increase its illuminating power would render it expensive. He therefore considered it would be inadvisable to undertake the distribution of this gas solely, whether carburetted or not. In his second chapter, however, he examined the advantages likely to result from its employment as an auxiliary to coal gas, and acknowledged that the relatively low initial cost of the plant, the great rapidity with which it could be brought into use, and the means it afforded for utilizing the surplus coke, were points in its favour. Moreover, with a mixture of one-third of "poor" gas and two-thirds of coal gas, the carbonic oxide would be reduced to about 17 per cent. In the third chapter, M. Lauriol suggested that one-third of the total volume of gas produced might be "poor" gas to which the Lewes or some other enrichment process could be applied, and that there should be some relaxation of the rule in respect to illuminating power, in view of the further development of incandescent lighting. As a set-off, he thought the minimum pressure at which gas should be supplied ought to be increased to 14-10ths. In the closing chapter of this section, the author dealt with the quantity of gas to be provided. Having carefully considered the statistics furnished by other countries (those for France not having been published), and taken into account the possibility of increased consumption resulting from the reduction in the price of gas, he concluded that it would be necessary to make provision at the outset for a daily production of 500,000 cubic metres (17¾ million cubic feet) of water gas and 1,500,000 cubic metres (53 million cubic feet) of coal gas, while making arrangements for at once doubling the manufacturing capacity of the plant.

The section of M. Lauriol's report in which he set forth his scheme for new works was one of the most important, containing no less than fifteen chapters. An indication of the scope of his proposals was given in the "JOURNAL" for Jan. 7 last (p. 27). In view of the inconvenience arising from having only one works, and the difficulty of finding in the centre of Paris a suitable site for their erection, he came to the conclusion that three stations would be needed, and he located them at Vitry, Bondy, and Gennevilliers. He studied the means to be employed for the storage and handling of about 1700 tons of raw material daily at each station, and the system to be adopted for its carbonization; and he decided in favour of double settings of horizontal retorts, 10 feet in length (6480 for each works), heated by generator furnaces, together with coal and coke handling machinery. Provision would be made for the manufacture of 170,000 cubic metres (6 million cubic feet) of water gas; and four gasholders each of about 4 million cubic feet capacity, would be erected. In the treatment of residuals, M. Lauriol proposed to have an installation of sulphate plant only; and the motive power on the works would be furnished by electricity. Each station would have two trunk mains, 48 inches in diameter, which would take the gas at a pressure of 20 inches, and compressors of 500-kilowatt power. With regard to cost, he allowed 7,000,000 frs. for extending the trunk mains, 36,500,000 frs. for purchasing the rising mains, branches, meters, stoves, fittings, &c. (being half the value of this plant), and 15,000,000 frs. for the augmentation in the expenses of first establishment consequent upon the probable increase in consumption. In the closing chapter of this section, he summarized the financial portions of his scheme as follows: Value of the installation, 276,000,000 frs.; expenses to be undertaken, 239,500,000 frs. He reckoned at 15,000,000 frs. the value of the existing assets. But if the present works were not utilized, this sum would have to be deducted from the second of the above-named amounts; leaving a total of 224,500,000 frs. (£8,980,000).

The next section of the report was devoted to the subject of the cost of manufacture, and it consisted of ten chapters. The author considered the working expenses per cubic metre of gas—first with the existing works kept intact, secondly with the addition to them of modern plant, and finally with the proposed new works. This study enabled him to ascertain what would be the financial results of working with the new stations, to compare them with the existing works, and to estimate the cost of operating the latter if extended and improved. He arrived at the following figures as representing the net cost of working under the three conditions named: At present, 8·4c.; with existing works in the future, 8·92c.; with the new works, 7·95c. He pointed out that if the present works were improved, the figure would be something between the two last—say, 8·6c. M. Lauriol closed this part of his report with a study of the total expenses, including the capital charges in relation to the possible selling price of gas. The latter he gave as follows: In the outskirts of the city, 15c. per cubic metre; in Paris, reckoning a profit of about 5c. per cubic metre on the total consumption—(*a*) without anticipating any reduction in price, 30c. from 1902 to 1905, and 18c. afterwards; (*b*) anticipating reduction, 20c. from 1902 to 1905, and 19·5c. afterwards. He pointed out the advantage accruing to the consumers by an immediate reduction in price.

In the succeeding section of the report, M. Lauriol estimated the worth of the present undertaking as a going concern. He first of all set aside the value put upon it by the Company, on the basis of their accounts, and took his own calculation for the new works; making allowance for the higher productive power of the latter as compared with those now in use. In this, he assumed that the new works would admit of a saving to the extent of 0·97c. per cubic metre; and he applied this figure to the quantity of gas consumed in 1899, to determine the economy which would result from the erection of new works. The sum thus obtained he capitalized at the rate of 3½ per cent., assuming a period of working extending over fifty years. He thus arrived at a sum of 70,000,000 frs. as the minimum value of the existing works; but he assumed that they would be worth 88,000,000 frs. to anyone who had the option of buying them or constructing new ones. Taking the value of all the rising mains, branches, &c., at 73,000,000 frs. (in round figures 86,000,000 frs., less 15 per cent. for depreciation), he arrived at a total of 161,000,000 frs. as the worth of the concern.

The author next passed on to consider the six proposals submitted as the bases of a new Treaty in regard to the gas supply of the city; and he concluded, as was announced some time ago in our columns, by adopting that of M. Chamon and his associates. This led him to the subject of municipal management, which he dealt with very fully. The limited adoption of this system in France compelled him to confine his investigations to the only two large industrial concerns carried on under State control—match and tobacco manufacture—and to the working of the State railways. In other countries, however, he found numerous examples; and these he carefully considered—a chapter each being devoted to Hamburg, Berlin, Cologne, Brussels, Birmingham, Glasgow, and Edinburgh and Leith. Three important points arose out of his study of these instances of municipal control. In the first place, there was an absence of centralization, accompanied by rapidity of decision and execution; next, the settlement of contracts by public adjudication was rarely resorted to; and, finally, the expenditure was not generally determined at the commencement of each financial year. M. Lauriol compared with

the foregoing examples of municipal management one now in existence in Paris—viz., the Central Markets section of the electricity supply of the city. This led him to lay down the conditions which, in his opinion, municipalized gas supply should fulfil in Paris. They were as follows: There should be placed at the head of the staff a general manager having in every respect the powers of a director of a company. Above him there should be either a consultative board, leaving all the responsibility with the manager, as in the case of State railways, or a council possessing powers of their own, like the board of directors of a private company. The settlement of the price of gas each year, the determination of the new works to be undertaken, and the money to be raised on loan, would rest with the Communal Council. With regard to the manipulation of the funds, this might be entrusted to a limited extent to the Gas Committee, but it would devolve mainly upon the Central Exchequer. In short, the Gas Department should be invested with the necessary powers to carry out effectually and speedily both autonomy and control. The working of the concern should be municipal and Parisian. Paris would then be in a position to sell gas beyond her limits, to private persons and to communities, in accordance with special agreements entered into by the controlling authority for the purpose.

M. Lauriol closed his report with an examination of the *pros* and *cons* of municipal control. He first of all compared the three systems possible—viz., direct control, the granting of a concession, and the formation of a "farming" company—setting forth the advantages and inconveniences attending each; and he came to the conclusion that the working results in the cases he had investigated did not furnish any proof that municipal management was better than that of private companies. So far as Paris was concerned, the City had two courses before it—either to undertake the supply of gas with new works, or to adopt the Chamon scheme with the old ones. He pointed out that the financial and other difficulties in the way of the erection of new works were numerous; and this fact put direct control out of the question for the time being. At the end of fifteen years, however, the City might, without difficulty, become possessors of the existing works, and take into its own hands the organization of the gas supply.

This was the report which the Commission discussed during their sittings; and in another article an indication will be given of their views thereon.

AMONG THE PROPHETS.

THE mantle which at one period in the history of the chosen people was an "outward and visible sign" of the prophetic spirit, is now no longer worn in that sense. Prophets of modern times are not distinguishable by their garb or uniform; otherwise it would long since have been incumbent on us to recognize Professor Henry E. Armstrong as such. He has found it expedient, since it is no longer becoming actually to assume the mantle of Elijah, to indicate, in the course of a paper which he has read recently before the Royal Society, many instances in which his prophecies have been verified by the subsequent turn of events. And so he stands revealed, by his own word, as a true prophet, despite the lack of an "outward and visible sign" of his mission. The "Chemical News" has lent its pages to the further dissemination of Professor Armstrong's paper, and has also incorporated with it a number of notes added by him the day after it was read before the Royal Society. Why the Society were denied the benefit of these notes, which in the whole extend to one-fifth the length of the original paper, is not clear, unless it be that the natural expansion of the Professor's ideas demands such an enlargement of their vent every twenty-four hours. If so, the outlook for his faithful and diligent disciples is truly appalling. We gather from the paper that he finds the expression "outward and visible sign" a pleasing one, so we will conclude that the notes added on the day following the presentation of the paper are "visible signs" of the rapidity with which his genius evolves such highly scientific memoirs.

The communication in question would be very interesting reading, but for the pitiful re-iteration in varied terms of the "I told you so" of the claimant to the prophetic mantle, and the stilted and cumbrous phraseology. Stripped of these blemishes, it would form a useful recapitulation of recent scientific work tending to elucidate the phenomena of luminosity, and to define "the conditions determinative of chemical change and of electrical conduction in gases." We will therefore, in the sequel, give an abstract of those portions of Professor Armstrong's paper which have a more or less direct interest for readers of the "JOURNAL," merely indicating quotations of the Professor's own words in the usual manner.

H. Brereton Baker, in February last, showed, at a meeting of the Chemical Society, an experiment which demonstrated that water alone does not determine the interaction of hydrogen and oxygen. A mixture of carefully prepared hydrogen and oxygen, enclosed in a thoroughly cleansed hard glass chamber, remains without appreciable interaction when the chamber is heated to redness, provided the gases have been dried as thoroughly as practicable. Even when the drying is not so nearly complete, no explosion occurs, though water is gradually, but slowly, produced. These observations may be interpreted to indicate that the amount of impurities in the gases had been reduced to such an extent that, even in the presence of water, it was too small to raise the conductivity to the point at which the rate of change would result in an explosive wave; while when the amount of moisture was similarly reduced to a minimum, the rate of change was exceedingly slow. The impurities—probably of an acid nature—in the gases, in admixture with water, constitute a conducting system. An electrolyte appears to be essential for the occurrence of chemical action, which may be regarded as "reversed electrolysis;" and as hydrogen, oxygen, and water are not electrolytes, the formation of water is dependent on the presence of something else—*e.g.*, an acid impurity. *Pure* gases should be perfect dielectrics—*i.e.*, the passage of an electric discharge through a gas can only take place if an electrolyte be present. This electrolyte would seem to be always a composite system, which may be looked upon as existing momentarily in a *quasi*-liquid state. On cooling a phosphorescence tube with liquid oxygen, the discharge in the gas ceases, probably because the traces of vapour of conducting water present in the gas are deposited, and the conducting system is thereby destroyed. The erratic behaviour of the discharge in vacuum tubes may perhaps be partially ascribed to the conditions being favourable to the formation of a conducting system including one or another of several substances present in the tube. Thus the mercury spectrum is only sometimes seen in tubes connected with a mercury pump.

The problem of electrical discharge in gases has not been dealt with in the careful way in which H. B. Dixon, B. Baker, and Shenstone have dealt with that of chemical change. It is possible that most of the effects now attributed to so-called radiant matter ("electrons") are really due to ordinary gross matter. Crookes refers to the discharge from a silver pole of *electrons* which cause the glass against which they strike to glow, while the silver volatilizes and is deposited near the pole; the metal meantime glowing as if red hot, though this "red heat" is superficial only. But as the silver would never be wholly free from oxygen, which would be given off, but partially re-absorbed, the bombardment of the glass referred to might have been partially effected by the displaced oxygen molecules. "May not the surface heating of the pole have been an outward and visible sign of the return of the truants to their silvery home?"

The luminous manifestations in vacuum tubes can scarcely be either mere collision or mere heat effects. Luminosity and line spectra seem to be the "visible signs" of the changes attending the formation of molecules from their atoms, or, speaking generally, to be "the consequences of chemical changes," using the latter term in its widest significance. Vivian B. Lewes has suggested that acetylene plays the chief part in promoting luminosity in hydrocarbon flames, and that the heat liberated by its decomposition endows the carbon particles produced from it with an incandescence far surpassing that corresponding to the temperature of the flame.* But though this may be accepted as a partial explanation, it seems needless to suppose that luminosity is consequent on the production of presumably solid carbon particles. The conversion of acetylene, or other hydrocarbon, at a high temperature into hydrogen and carbon, although in the ordinary sense a decomposition, doubtless involves the interaction of several molecules, and the consequent formation of carbon molecules of a high degree of complexity along with hydrogen molecules. It is an exothermic change, because the energy liberated in the combination of the carbon atoms among themselves, and also of the hydrogen atoms, is far in excess of that absorbed in the decomposition of the hydrocarbon molecules. The initial "luminance" may therefore well be that of the molecules at the moment of formation prior to condensation. Perhaps, however, hydrocarbon flames acquire their special value through the continued incandescence of the carbon molecules, after their reduction to the solid state, contributing largely to maintain luminosity. This explanation of the phenomena appears requisite to meet the cases of the luminous appearance of flames in which the products of combustion are gaseous—*e.g.*, a hydrogen-oxygen flame burning under pressure.

The brilliant luminosity of the electric arc may be explained by the dissociation of the carbon molecules by the current; the re-association of the atoms into molecules giving rise to the intensely luminous effect which is characteristic of the electric arc. It must undoubtedly be true, in the case of the Welsbach mantle, that, as Bunte has argued†, the high luminosity is due to the power which a substance such as ceria possesses of forming a peroxide, whereby combustion takes place at a surface on which such a substance is present to a greater extent than on one consisting of a neutral oxide. Thus the temperature is higher at such a surface, and it is unnecessary to assume that the earth used has a superior specific radiating power. But the *chemical changes* occurring at the surface may further be regarded as the direct seat or origin of the luminosity. A higher oxide is probably alternately decomposed and re-formed, or the process is one of oscillatory oxidation. The catalytic influence of the oxide induces more complete combustion to take place at its surface than would occur at an equivalent neutral surface. In

* See "JOURNAL," Vol. LIX., p. 795. † *Ibid.*, Vol. LXXI., pp. 398, 477.

consequence, the temperature developed at the surface of the oxide is higher than that of the flame generally. Only one or two oxides besides ceria are effective in similarly inducing more complete combustion. Cerium dioxide is remarkably stable at high temperatures. A similar explanation may apply to the incandescence of the earth in the lime light and zirconia light, and perhaps to the efficiency of the Nernst lamp. The maximum effect in the Welsbach mantle may well be attained when only a relatively small proportion of ceria is present, because at the particular state of dilution the ceria is in solid solution in a form in which it is most prone to suffer change. Thus, in addition to being then under the necessary conditions of freedom, the ceria attains the most suitable degree of molecular complexity, and its greatest activity, while in dilute solid solution, just as many substances do in dilute liquid solutions. A. C. Swinton has found that when rare earths were heated *in vacuo* by cathode rays, an intensity which gave a brilliant light with the Welsbach mixture of 99 per cent. of thoria, and 1 per cent. of ceria, or with so-called pure thoria, gave practically no light with so-called "pure" ceria, or with a mixture of equal parts of the two earths.* But "pure" could only have been used in a comparative sense. The effect produced by small quantities of ceria is very greatly dependent on temperature, and increases therewith. Hence the greater light which thoria was found by Swinton to give under the influence of cathode rays than in the bunsen flame, may have been really due to its having been rather more highly heated by the former. The luminosity of oxides at high temperatures is not, in the opinion of many authorities, merely a high temperature effect.

The phenomena of phosphorescence under the influence of the electric discharge, as exhibited by the oxides and basic sulphates of the rare earths, may be due to recurrent polymerization, if not to oscillatory oxidation. Crookes's view that yttria, lanthana, &c., are characterized by definite phosphorescent spectra, is opposed by Lecoq de Boisbaudran, Baur, and Marc, who find that the colourless oxides and salts of yttrium, gadolinium, and lanthanum are not specifically luminescent, but that they yield the spectra hitherto ascribed to them when mixed with minute quantities of earths which have coloured salts—such as erbium or neo-or praseo-dymium. The earths which have coloured salts impart the same spectra equally to lime or calcium sulphate as to yttria, &c. It may eventually be possible to correlate the production of visible colour with that of a luminous spectrum, and to regard both as originating in the same intramolecular mechanism. Carrying the same line of argument a stage further, all phosphorescent phenomena might be regarded as the result of oscillatory changes in molecular structure. The slow decay of the effect observable in many cases may be compared with the slow discharge of a condenser, the charging of which may be regarded as merely a process of molecular deformation of the dielectric.

Energy of low period would seem to suffice to bring about, in a case like that of radium, the change of which the reversal subsequently gives rise to the luminous effect and radio-activity. It is possible that radio-activity may not be, as at present supposed, an isolated phenomenon, but a concomitant of many chemical changes. An attendant class of effects are those attributed to emanations from radio-active substances. These emanations behave very similarly to ordinary gross matter, and such is very possibly their character, while they are only secondary products engendered by radio-activity.

Under such an influence, hydrogen peroxide is necessarily a product of the oxidation of any substance; but usually the conditions prevailing engender its immediate decomposition. On this basis, the oxidation of zinc must be regarded as entailing the following cycle of changes: The metal, being impure, provides both the negative and the positive electrodes, and electrolyzes the water, which, because of its contained impurities, is conducting. The oxygen liberated goes to the metal, while the hydrogen becomes associated with a molecule of oxygen, which acts as depolarizer, and forms hydrogen peroxide. The products are thus zinc oxide and hydrogen peroxide, instead of only the former, as is commonly held. Recent researches on the ionization of air and other gases may be elucidated by this argument. Faraday defined *ions* as "those bodies which can pass to the electrodes;" but ionization is now taken to connote molecular disruption. If, however, greater care were extended to the study of the phenomena of conductivity presented by gases, the conclusion that they undergo ionization in the sense of molecular disruption might be disproved. Some attention ought also to be directed to the question whether mere molecules cannot form conducting systems.

Such is the substance of Professor Armstrong's recent paper, bereft of much of its pompous phraseology and stilted language. To gas men, it is especially interesting in respect of its references to the luminosity of the rare earths. There is one allusion which suggests that the Professor knows more thereon than he cares to divulge; and were it not that he is commonly reputed to be one of the ultra-conscientious Fellows of the Royal Society, who regard expert witnesses as anathema, we might suspect him of having studied the subject with a view to giving evidence in the great patent rights litigation which Sir George Livesey's influence with the Welsbach Board was instrumental in suppressing some months ago.

*See "JOURNAL," Vol. LXXIII., p. 1743.

SIR GEORGE LIVESEY ON THE SOURCE OF THE WEALTH OF NATIONS.

IF a number of practised observers of men and things in the gas industry were asked to specify shortly the reason for the extraordinary interest that attaches, by common consent, to the personality of Sir George Livesey, one might say one thing and another something quite different; and all might be in a measure right. So many-sided a character must naturally appear to reflect and justify many different personal judgments. It is not our intention to catalogue the various senses in which Sir George Livesey strikes his contemporaries and fellow workers in gas as a remarkable man. That he is a remarkable man in more ways than one, is a statement to which there must be a very general subscription, irrespective of all question of merit. There is a very obvious objection to the public discussion of any living person's individuality; while after a man is dead the objection is still more strongly felt, although on different grounds. Yet the task of personal criticism must sometimes be performed, unless a great deal of the value of a notable career is to be wholly lost, which would be highly regrettable, especially in the case of a life passed in so comparatively secluded an environment as that offered by the gas industry to its followers. The question is, therefore, as to which of the salient features of any individual who is regarded by common agreement as a power in the land and in the place to which he has been called, can be distinguished by his contemporaries, not merely without offence, but usefully for the sake of the example. For men may be recognized and talked about by other people for peculiarities which, even though harmless, are neither inspiring nor edifying. That is simply gossip; and it is popular enough in every relation of life, as witness the bulk of writing and publishing in books and newspapers "mainly about people." But this article is not meant to be gossip about Sir George Livesey, whether censorious or appreciative. Rather is it designed to lay before our readers (most of whom have their own opinions about one who for his part, has never been chary of supplying the world with materials for its judgment upon himself) some reasons for the extraordinary fascination of this remarkable personality.

In a word—the explanation seems to lie in the wielding by Sir George Livesey of the power of the imagination, for the inception and development of the causes of which he makes himself a champion. It is a commonplace to speak of the original mind of the man, and of his indomitable will in carrying any policy on which he may have set his heart. But, it is scarcely necessary to remark, originality and perseverance may have a bad and uninspiring quality, as well as an admirable one. Some men are for ever originating projects which they had better have left alone, and exercising their will power in furthering plans which do not enhance their reputation. Other men, of consideration in their day and sphere, are condemned to remain uninteresting, solely because they have no imagination of the order that inspires themselves and enlists the sympathy of others. There were many Elizabethan freebooters to one Raleigh.

This faculty, of the possession and power to direct and exercise imagination, is behind and at the bottom of that active pioneering in many fields which constitutes Sir George Livesey's chief claim to fame, and has won him the Royal favour that no gas worker had previously earned. It supplies the explanation of why causes seem to develop in his hands. Take his conversion to the principle of profit-sharing, as a means of enlisting the interest as well as recompensing the labour of gas workers. It was no novelty, and in other hands had failed almost as often as it had proved satisfactory. Sir George Livesey, however, saw through and beyond the means, and perceived an end which others had failed to observe. This object in the course of time defined itself in his mind into the deliverance of the working, or rather the wage-earning, classes generally, from their virtual exclusion from all share in those enterprises of their country of which capital is the principal agent. No professed economist, he nevertheless saw more of the interrelations of capital and labour than all the professors could have taught. He saw the emptiness and chilliness of scholastic political economy, with all its fables about Will Trusty who got on and married his master's daughter, and Rob. Reckless who got hanged for unsuccessful piracy. He recognized, what the professional economists said nothing about, that those wage earners who had no capital and yet became millionaires must always be extreme exceptions to the common rule, and that it is absurd to expect the vast majority to be contented because a very few like themselves grow rich. On the other hand, he saw the growth of an irregular power which essayed to remedy this discontent by the invocation of principles which are known by the name of Communistic, and repose on methods which are none the less anarchical because this is not avowed. So long as there are half-bricks to be picked up, the remedy of the universal strike can always be regarded as lying well within the scope of practical working-class politics. The Taff Vale judgment has cleared the ground of half bricks; and strikes have accordingly gone out of fashion. But Sir George Livesey sought a better way than opposing force by force. It was comparatively easy to carry on the work of the South Metropolitan Company under police

protection; but the proper object was to supplant a disaffected working force with one which should be loyal in fact, for reasons not to be gainsaid or overpowered by specious argument.

Hence not only the South Metropolitan profit-sharing scheme; but its developments of workmen's proprietorship, and the workmen-directors. It was, of course, the one-man power of the Chairman that carried out this policy; but no time was lost in placing the system under such a guarantee of permanency that the removal of the designer's hand should not bring the plan to nought. Magna Charta remains, although the barons are dead and the very type of civilization to which they belonged has passed away. Still, feudalism, having served its turn and departed, is not wholly without its witness in the modern world; and even though the wage system of recompensing labour were to be superseded, it would continue to exert influence and teach lessons. Sir George Livesey does not ignore the magnitude of the industrial reform to which he has set his hand; but he is more fully persuaded than ever that in his favoured way, not in the way of keeping up the separation between employers and employed, lies the possibility of the amelioration of the status, as well as raising the recompense, of the working classes. His imagination has never ceased to play round the actual facts of the situation he has created; and in his address on the thirteenth annual profit sharing, Sir George says to his "friends and fellow workers" of the South Metropolitan Company:

As time passes, my ideas on our profit-sharing system grow; I will give you the latest. The last century, the nineteenth, may be said, mainly by means of the joint-stock limited liability system, to have brought into existence our great and well-to-do middle class. Why should not the present century, the twentieth, lift the working classes generally into the position of participators in that prosperity? Why should not they become shareholders, partners—in fact, part owners on a large scale—in all the great industries of the kingdom? I fully believe they will; and profit sharing, worked on our lines, seems to be the most likely means for their elevation, and for satisfactorily solving the great question of the relations of capital and labour. May we all do our part right well in this great work. Prior to the Nineteenth Century, the middle classes were few in number and comparatively poor, both in means and influence. Public companies were few and small, and in few hands; for liability was unlimited, and any shareholder who was worth powder and shot could be sued for the debts and liabilities of a company. Many wealthy men were thus ruined; while prudent men carefully avoided joint-stock enterprise. Businesses generally were small, because they had to be carried on by the resources of their individual owners; for the multitude would not invest their savings in such risky ventures. At the end of the Nineteenth Century, what do we see as the result of joint-stock enterprise with limited liability—that is, every shareholder's liability is limited to the amount of his shares? All our railways, our gas, water, and other companies performing great public services. Nearly all large industrial undertakings and manufactories, most of our shipping, and, in short, almost all businesses of any importance are in the hands of joint stock companies; and of the thousands of millions of capital thus invested, by far the greater part consists of the savings of the middle classes during the Nineteenth Century. Those savings were necessarily small at first; but they gradually increased, and have now reached an enormous aggregate of wealth. In this great inheritance, the working classes have but a very small share; but they have made a beginning. There is no reason why the Twentieth Century should not do as much in this direction for them as the nineteenth did for the middle classes. This view of the matter increases the importance of our profit-sharing shareholding system, and will, I hope, be an inducement to all participators to do their best to make it a still greater success in every way.

This extract from his address shows that his conclusion as to the result of joint-stock enterprise, with limitation of liability, regarded as a distinguishing mark of the Nineteenth Century, is something to ponder over. On the whole, he is correct in his judgment upon the great and far-reaching results of the system, of which the gas industry is one of the most prominent examples; for the limitation of liability to the amount of the shares was enacted by Gas Acts long before the principle was esteemed of universal validity. Notwithstanding all that can be advanced against it—and this is a great deal—the joint-stock company limited has approved itself as the most successful innovation of recent times for the carrying on of large business operations; and some of its gravest defects are no worse than such as might be found where the principle of limited liability is absent.

Incidentally, this view helps to explain the apparent anomaly, of which writers like W. S. Lilley make so much—the occurrence of destitution and misery in reputedly "rich" countries, like England and France; whereas in "poor" countries, like Bohemia, such painful incongruities are lacking. The explanation is that where there is enterprise, and joint-stock trading, there may indeed be destitution and some misery coexistent with the wealth which rewards enterprise; but in a poor and frugal country, there is no surplus, and the natural growth of the population have to emigrate in order to live at all. There may be less apparent misery in Bohemia and in Southern Italy than could be found any day in London or Paris; but this does not affect the truth that England and France are rich, and Bohemia and Italy are poor, countries. In the former lands, money circulates freely, and fructifies as it goes; in the latter, it is hoarded, for fear of losing it. Consequently, it remains infertile. Hitherto, in this country, the savings of the working classes have been regarded as being of the nature of a strange phenomenon, almost a miracle, and as such have been treated with an exaggerated degree of respect, and even reward.

The time has come, however, when the policy of coddling the workman's savings, and encouraging him to invest them in a particular way—as in the purchase of his house—must be abandoned for something more respectful to the workman's business capacity. He cannot be "hard up," to judge from the evidence of his lavishness laid before Parliamentary Committees upon betting and clubs, and the statistics of the beer and tobacco trades. Nobody wishes him to leave off backing horses which he never sees, in order to speculate in shares of companies of which he knows even less; but there is a middle way, and Sir George Livesey has found it. Even the municipalized workman should be encouraged to invest his savings in the bonds of his corporation, without troubling the gentlemen of the Stock Exchange. It ought not to be forgotten, moreover, that this also was one of Sir George Livesey's victories over the force of routine; and it is one that does not make him popular on the Stock Exchange, or wherever the influence of this institution is paramount. It was his imagination, again, that led him to deliberately set routine at defiance; where the more hide-bound administration would have simply acted according to routine, pocketed their fees, and let the consequences follow. The method of the "guinea pig," however, is not for Sir George; and it will not be good for this sort of gas company director when the British workman has a voice in his election.

EDUCATION AND INDUSTRIAL PROSPERITY.

PERHAPS the chemical industry more than any other has cause to be concerned over the liberality of education in Germany; and it was not surprising therefore to find the subject protruding rather prominently in the proceedings at the annual meeting of the Society of Chemical Industry at Liverpool on Wednesday last. University College was the place of meeting; and Principal Dale welcomed the members. During the last few weeks, it has been the duty of this scholastic gentleman to trace the progress of chemical instruction and industry in Germany; and he confesses that it has come to him with overwhelming force that, in that country, the progress and development of chemical education has been followed by a corresponding development of the chemical industries. It is evident, from his subsequent remarks, that Principal Dale entertains a strong feeling that the development of national education on the broadest and widest lines is an immediate necessity, if the commercial strength and stability of Great Britain is to be maintained.

Then in the address of the President (Mr. Ivan Levinstein, who, owing to severe illness, was absent) we find the view that the vital question for trade and industry is neither primary education nor higher technical education, but efficient non-specialized secondary education. But he doubts if the Bill which is engaging the attention of Parliament will, or can, provide all that is wanted; the financial provision for new secondary schools being totally inadequate if England wishes to be on a level with Germany. The German secondary system, it is true, offers remarkable inducements first to parents to keep their boys at school, and secondly to make them work while at school; but we in this country can, as things rule at present, offer no such incentives. It is rather distressing to hear from one who has devoted so much of his mental power to the promotion of the welfare of the chemical industry as Mr. Levinstein that, in his judgment, the millions of money spent on technical education in this country have been in the main sadly wasted. So sweeping a declaration should serve as text for a little serious rumination on the part of our educationalists.

There is one other part of Mr. Levinstein's address which is of general interest, and it is where he deals with the factors that have made for Germany's advance in industry and commerce in comparison with our own retrocession in the rate of progress. Put in a nutshell, these factors are: (1) Superior economy and attention to detail. (2) The possession of more trained brains than any other country. (3) A close alliance between legislation and science on the one hand, and industry and trade on the other. (4) A national system of canals, with internal and external freight charges averaging less than one-third of our own. (5) Cheaper skilled labour, with longer hours than our own. (6) A large supply of unskilled labourers trained to habits of punctuality and discipline by military service. (7) Protective tariffs. (8) A patent law system protecting the interests of the public as well as those of the inventor. It is outside the province of the "JOURNAL" to deal with the terrible load of inferiority which Mr. Levinstein lays on this country. But the measures which, according to him, require immediate attention for our improvement do not seem to be so imposing and insurmountable that they need terrify a nation that has of late shown such courage, boldness, and strength as our own in other directions. The measures are: (1) The appointment of a competent and expert Minister of Commerce; (2) the nationalization and extension of our canals and waterways; (3) a measure for largely extending and improving our system of secondary education; and (4) a reform of our patent laws. And upon these points few will be disposed to quarrel with Mr. Levinstein.

ELECTRIC LIGHTING MEMORANDA.

The Amendment of Electric Lighting Orders—The Bermondsey Precedent—The South Metropolitan Gas Company as Defenders of the Ratepayers—False Pretence of Cheap Municipal Electricity.

One of the most important reforms of the statutory conditions under which local authorities are empowered to embark in electric lighting undertakings was quietly effected by the Earl of Erne's Committee of the House of Lords, in the case of the Bermondsey Order, which came up for confirmation in the Electric Lighting Provisional Orders (No. 8) Bill, as reported in our "Parliamentary Intelligence" last week. This Bill was petitioned against by the South Metropolitan Gas Company, on the grounds set out in the report. The chief point taken by the petitioners was that while they are large owners and the largest ratepayers in the borough, they would not, from the nature of their business, derive any advantage from the proposals of the Bill, which could only be carried out at the charge of the rate fund. They asserted that the proposed undertaking could not be remunerative, while the special circumstances in which the local authority would have to exercise their statutory powers, would increase the risk of loss. They therefore asked the Committee to insert a provision in the Order to ensure that the price charged for electricity should be such as to make the undertaking self-supporting, and that no deficiency of income arising therefrom should be chargeable on the rates.

It is sufficient to read this request to appreciate both its fairness and also its enormous significance. It is not quite novel, inasmuch as a precedent exists in several Tramways Acts, especially the Broughty Ferry Act, with the natural difference that these Acts dealt with fares instead of the supply of electrical energy. The principle, however, is the same; and seeing how closely other principles of tramway legislation were followed in the drafting of the Electric Lighting Act, 1882, it is impossible to logically object to the copying of one more. Still, of course, the promoters did object; although they were so far impressed with the justice of the proposal as to offer to the Gas Company exemption from liability to bear any share of the loss on the undertaking if after three years it should prove to be unremunerative. This plausable offer was wisely rejected by the Company; and eventually the Order was confirmed, with the inclusion of a provision requiring the undertakers, every year after the first, to cause to be laid before them a statement of accounts in the Board of Trade form, upon which they are to fix the price of electricity for the ensuing year at such a figure (not above the maximum sanctioned) as may be reasonably expected to cover the expenditure for the same period, so that there shall be no charge upon the rates. The same provision has since been made in the Woolwich Order, which was restored to the Bill after having been struck out through non-appearance of the promoters, and was dealt with last week.

In securing this much-needed reform of the statutory regulation of municipal trading in electricity, the Chairman of the South Metropolitan Gas Company has given one more proof of his peculiar genius for parliamentary campaigning. It will take some time for the partisans of municipal trading in general, and the trading of local authorities in electricity supply in particular, to realize what a breach has been made in their line; but when they do, great will be the uproar. Yet they can hardly resist the extension of the precedent; for the cause they have espoused is not merely municipal trading, but municipal trading "at a profit." Profitable electricity supply will not be touched by the Bermondsey precedent. But where is it to be found? And upon what basis is the actuality of profit to be ascertained? Not the least important of the points of the precedent is that something like full and fair book-keeping is part of the obligation laid upon the undertakers. This requirement will certainly cause dismay in many municipal trading quarters; but, again, it cannot be reasonably resisted.

Exception was taken by Counsel for the promoters of the Bermondsey Order to the interposition of the South Metropolitan Gas Company in defence of the ratepayers. The objection failed, perhaps because the Committee felt that special protection of the Gas Company, as such, could not be made effective. Experience of the Electric Lighting Act, 1882, bears out this supposition. After a great deal of argument, a so-called protective clause (29) in the interest of gas undertakers was inserted in the Act; but it has been a dead-letter. The new protection, which gas undertakers are to share with all ratepayers, is far preferable. It will be the fault of gas companies if henceforward they fail to ask for the insertion of the clause in every Electric Lighting Order which touches them. The Board of Trade will respect the precedent whenever their attention is called to it. Really, it is high time the recklessness of local authorities in involving the ratepayers in losing electric lighting undertakings on the faith of promises made by their "consulting" electrical engineers was curbed. Nobody wishes to prevent such localities, or individuals, as desire electric light and are willing to pay a fair price for it, from having their desire gratified. But that is a very different matter from the imposition that has in too many places been carried out in the name of "progress," where electricity supply undertakings that cannot possibly pay have been started by, or else foisted upon, helpless communities through the vanity or the self-interest of influential individuals. And when the plunge has been taken, and the "consultant" has departed with his fee, or the enterprising local magnate has cut his loss or cleared his profit on the municipal deal, there is nothing for the disillusioned ratepayer to do but "grin and bear it." It is usual to spare his feelings by concealing from him the real amount of his loss. He has to pay for extra street lighting that nobody wants and many dislike, in order that the subsidy to the undertaking from the rates may look the smaller. The time comes, however, when the workhouse, and the public baths, and the free library, and the town hall have all been fitted up with the greatest number of electric lights they can hold; and then what is to be done to work up a semblance of extending business?

Meanwhile, an unduly low tariff is usually maintained, to the glory of municipal trading. Does not the undertaking pay? Is there still an annul deficit, and is a depreciation fund yet unattainable? The excuse offered is "as usual"—as the "Electrician" accountant remarks—the cheapness of the service, which is always advanced by the partisans of municipalism to the glory of the principle. They never admit that in all such cases it would pay the local authority to give all the consumers of electricity on their books a handsome present and tell them to return to gas at the first opportunity. Who would ever have thought at the time the Electric Lighting Act, 1882, was passed, that the local authorities so favoured by the Act would within twenty years be found selling for 4d. per unit, electricity costing them double the money? And this after years of experience? The Bermondsey clause will help to force municipalities to recognize the hard facts of the electric lighting business; and for this compulsion the South Metropolitan Gas Company deserve the thanks (which there is no reason to believe they will ever get) of the Municipal Corporations Association, as well as of many gas companies.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 164.)

The Stock Exchange had a very poor time of it last week—very little business, and most of it bad. To begin with, it was a week largely given up to sport and fashion—Henley afloat, and Eton and Harrow ashore. And Saturday capped it all with the great Kitchener greeting. So that work was a good deal interfered with. Then, as to the quality, it was evident that the scent of the Peace-boom had been largely overrun, and that, in the rush to become rich at one coup, a number of weak people had got out of their depth. So, in the settlement last week, their corpses were brought on shore and hammered. The process of effecting the survival of the fittest was not exhilarating, and fresh business was a good deal left alone. Prices suffered inevitably, and most things are down, except in quarters where special circumstances buoyed them up. However, things will be all the better when the purging process is completed. In the Money Market, the demand in connection with the Stock Exchange settlement caused a temporary stress; but at the close there was nothing of tightness. In the Gas Market, business was quiet to an unusual degree, and on no single day was there anything approaching a moderate day's allowance of transactions. And, perhaps for the first time in our record, there was not any change of quotation in the whole week, except those arising from *ex div.* alterations. In Gaslight issues, a little was done daily at about middle figures until Saturday, when one or two parcels were disposed of at prices well below the quotation. However, the latter was left standing. The secured issues were unusually active for them; there being quite as many dealings in them as in the ordinary. South Metropolitan was steady, at good middle figures. Commercials were neglected. The Suburban and Provincial group were unnoticed save in the Mart, where more shares change hands in a week than on the Stock Exchange in months. The Continental Companies offered nothing to call for remark; and the undertakings in the remoter world were equally devoid of interest. In the Water Companies, there was only one change in quotation; Lambeth 10 per cents having risen 5 points on Monday. The struggle in the House of Commons over the Government Bill has begun; and the lively proceedings of the opening day give promise to all interested parties of a keen debate over their concerns.

An Old Municipal Water Undertaking.—At the annual meeting and conference of the Institute of Municipal Treasurers and Accountants, held in Hull last Thursday, the President (Mr. T. G. Miller), in his address, reviewed the progress made in domestic sanitation during the past fifty years, and referred at length to water undertakings. In the course of his remarks, he stated that the water-works in Hull had been owned by the Corporation since 1447, when a Charter was granted by King Henry the Sixth; and for 455 years the city had been supplied from the same source.

THE GERMAN GAS AND WATER ASSOCIATION AT DUSSELDORF.

Supplementary Report of the Proceedings.

THE following further particulars of some of the papers read at the meeting of German Gas and Water Engineers at Düsseldorf last month will supplement what has already been given in the special report of the proceedings in the "JOURNAL" for the 1st and 8th inst. (pp. 19 and 86). The present particulars are taken from the official report in the "Journal für Gasbeleuchtung."

INCLINED RETORTS AT CASSEL.

Herr Merz, the Manager of the Cassel Gas-Works, in his paper on the "Installation and Working of Settings of Inclined Retorts," referred to the generally favourable experiences afforded by Coze settings at Cassel and elsewhere. With temperatures of 1000° to 1100° C. (about 1830° to 2000° Fahr.) in the interiors of the retorts, he had found that the thermometer indicated that the differences in the temperature did not exceed 40° C. (72° Fahr.) The construction of the settings, he said, presented no difficulty; and the durability of the retorts was not inferior to that of horizontals. He then referred to the differences in the cross-section of inclined retorts as commonly used in Germany and in England. Coze settings, he continued, solved the problem of how to attain the maximum production of gas on a small area. They were natural drawing and charging machines, and admitted of but slightly trained and not particularly strong men being employed, who, moreover, were better protected from the heat than they would be with settings of horizontal retorts. The cost of erecting a retort-setting with inclines was not very much greater than that of a setting of horizontals with charging machines; but even if this were the case, the Coze settings would be preferable, as they constituted a natural automatic drawing device. The gas industry would not, however, remain at a standstill; and the water-gas process would continually become more closely associated with gas manufacture. Pending that consummation, however, Coze settings would make triumphal progress through the world, and the name of Coze would always be received with acclamation.

Herr Leybold and Herr Rother spoke shortly on the paper; and then Herr Ledig quoted some comparative figures of the working of inclined retort-settings alone, and a combination of inclined and horizontal retort-settings. In the case of the Coze settings, the gas cost 1s. 2½d. per 1000 cubic feet; while when both types of settings were in use, the cost was 1s. 7¼d., or about 32¼ per cent. higher than with inclines alone. Herr Mertens, of Posen, corroborated the favourable results, and recommended the employment of longer retorts whenever Coze settings were being erected. Others who spoke were Herr Kellner, of Mühlhausen, Herr Weiss, of Zürich, and Herr Kohler, of Metz, who has adopted Coze settings entirely. Herr Merz, in conclusion, replied to the discussion.

RECOVERY COKE-OVENS.

The subject of recovery coke-ovens was dealt with by Herr Hilgenstock, of Dahlhausen. He said that prior to about thirty years ago, coke-works took gas-retorts as a pattern for the recovery of bye-products. There were then introduced the Coppée oven, and the so-called Otto-Hofmann oven. Gas production commenced at 300° to 500° C. (570° to 930° Fahr.), and advanced so gradually that there could be no question of unfavourable effects from the formation of tar. The outer layer yielded 8610 cubic feet of gas per ton of coal; the inner layer, 9295 cubic feet. The formation of ammonia showed only a slight difference, which signified that the formation first began to occur at the higher temperatures, when coke production had already greatly advanced. The gas from coke-ovens differed but slightly from that from retort-settings. The author of the paper did not hesitate to assert that good gas coal yielded better and cheaper gas in coke-ovens than in gas-retorts.

THE COMPETITION OF ELECTRICITY.

Herr Ross, of Vienna, is, as his name suggests, an Englishman, who, however, has for many years practised as an engineer in the Austrian capital. He gave some data interesting to gas as well as electrical engineers in his paper on "The Working Results of Electricity Works, and the Prime Cost of Electric Current." He said that ten years ago he had pointed out that municipalities were under the obligation of putting electricity at the disposal of the inhabitants, just as was the case with gas and water. During the past decade, the population of Germany had increased by 23·3 per cent.; while gas consumption had risen by 49·3 per cent. The consumption of gas for heating purposes had increased by 19 per cent. per head of the population, while that of gas for illuminating purposes had dropped by 13 per cent., for which falling off electricity was doubtless responsible. Gas-engines during the past ten years had increased by a total of 18,000-horse power; while electromotors had increased by 44,600-horse power. It ought to be borne in mind that only the larger towns had electricity works. The current disposed of by electricity works was used, as to 35 per cent. for lighting purposes, and as to 65 per cent. for power purposes. With gas-works, the relative positions were reversed—65 per cent. of the gas disposed of being for lighting purposes, and only 35 per cent. for power purposes. The capital cost of the installation of electricity works ranged from £75 to £175 per kilowatt. A works with an annual output of 3 million kilowatts and upwards should not show working expenses above 70 per cent. Thus, though the cost per kilowatt-hour was admittedly higher than that of a cubic metre (35·3 cubic feet) of gas, yet it should not be forgotten that the selling price of 1 kilowatt-hour was considerably higher than that of 1 cubic metre of gas. If electricity works should be able to reduce the price per kilowatt-hour to 3½d. to 5d., they would take away many consumers from gas undertakings.

INCANDESCENT GAS LIGHTING.

Herr Drehschmidt, of Berlin, read some notes on "Incandescent Gas Lighting and High-Power Burners." He said that while incandescent gas lighting was very much cheaper than the incandescent electric light, electricity had earlier had a monopoly in respect of powerful sources of light. Now, however, the competition of gas had extended in this direction also. Rothgiesser and Salzenberg had led the way, and other inventors had followed. Most of the high-power gas-burners, however, showed a not very favourable duty per cubic foot of gas consumed. Thus, while 22½ candles were obtainable per cubic foot of gas with the ordinary incandescent gas-light, the high-power burners gave only 16½ to 17¾ candles per cubic foot of gas consumed. The "Millenium" light, however, which had a consumption of from 8·8 to 53 cubic feet of gas per hour, and a double mantle of considerable length, yielded as much as 1580 candles, or gave a duty of 31 candles per cubic foot. It gave a very good illumination of the ground. For instance, in the Alexanderplatz, in Berlin, it gave an illumination of 49 "lux," compared with 15 "lux" afforded by the electric arc lamps in the Leipziger Strasse in the same city. Owing to the great height of the lamp-columns, the burners were lighted either by means of platinum, which was rendered incandescent by a feeble electric current, or by pneumatic automatic lighting devices. Herr Drehschmidt concluded by exhibiting a new apparatus for burning off mantles, devised by Herr Buhlmann.

In the discussion on this paper, Herr Schäfer, of Dessau, said that he was able generally to confirm the author's experiences with high-power gas-burners, but that he had not obtained such good results with the "Millenium" light as those given. In particular, he had found that the mantles almost always became defective after three or four hours use. Herr Drehschmidt replied that he thought this unfavourable experience must be due to improper treatment of the mantles.

GAS PURIFICATION.

Dr. H. Bunte, in his lecture on "Gas Purification," treated his subject from the standpoint of the removal of injurious impurities from the gas, and not from that of the recovery of valuable bye-products. He began by briefly referring to the most prominent labours of English and German chemists on the subject. He dealt with the following constituents of the gas in the order named: Sulphuretted hydrogen, carbonic acid, carbon disulphide, carbonic oxide. Sulphuretted hydrogen, he said, was removed by oxide of iron almost exclusively. The earlier methods had been modified by combining purification with the revivification of the material within the vessels by means of oxygen or air. This process had proved good on the whole, though, under certain conditions, derangements were possible. Specially interesting were the thermic conditions in the absorption of sulphur and the re-formation of the oxide of iron. Hydrated ferric oxide (Fe_2O_3, $3H_2O$), he said, reacted with sulphuretted hydrogen ($3H_2S$) to form sulphide of iron (Fe_2S_2) and sulphur (S), while water ($3H_2O$) was liberated. Closer consideration of the thermic exchanges involved showed that by this reaction 14·9 calories were liberated per gramme molecule (214 grammes) of hydrated ferric oxide. The sulphur was therefore taken into combination with but relatively little heating up occurring. On the other hand, when the material was revivified, hydrated ferric oxide (Fe_2O_3, $3H_2O$) and sulphur were formed from the sulphide of iron (Fe_2S_2) under the influence of water and oxygen, and 145 calories were liberated per gramme molecule (88 grammes) of sulphide of iron. This implied that the heat thus liberated was nearly ten times as much as the heat resulting from the combination of the sulphur. One pound of sulphide of iron liberated about 725 calories. The heating up could easily proceed until ignition resulted. Any considerable degree of heating was, however, very injurious, and had to be avoided. It caused the evaporation of the moisture, and thus brought the revivification to a standstill. Sulphocyanide was formed, and the amount of ferrocyanide was diminished in consequence. These disastrous results had to be avoided by adding more water.

When air was added to the crude gas, the Professor continued, both the process of the absorption of sulphuretted hydrogen and that of the revivification of the oxide of iron proceeded simultaneously. Consequently, there was ten times as much heat evolved in the purifying vessel as by the old method, in which air was not mixed with the gas. Both observation and calculation showed that with new, clean material, a rise of temperature of

about 54° Fahr. could ensue. The gas thus warmed might take up very much moisture, and the material would thus easily be rendered hard. The water taken up would be again separated by condensation in the succeeding cool vessels. The first process—viz., that of the absorption of the sulphuretted hydrogen with formation of sulphide of iron proceeded very rapidly; while the second process (the reproduction of the oxide of iron) proceeded slowly. Hence the material gradually became richer in sulphide, and ultimately special revivification became necessary. The addition of air should, for the best results, be made at the hydraulic main, as the air then took up illuminants from the warm gas, and was carburetted. The proportion of air admitted depended on the amount of sulphur in the gas or coal. One volume of sulphuretted hydrogen required half-a-volume of oxygen or 2½ volumes of air. The most suitable method of adding water must be ascertained by practical experience. Excessive heating might result in the formation of carbon oxysulphide, which was readily decomposed with water, but in the absence of water might pass on with the gas, and be subsequently decomposed into carbonic acid and sulphuretted hydrogen. This production of carbon oxysulphide had not, however, been proved to occur in practice.

Carbonic acid, Dr. Bunte proceeded to say, was the most arch opponent of illuminating power when the gas was consumed in flat-flame and argand burners. One per cent. of carbonic acid caused a deterioration of about 0·88 candle. The reason was that the carbonic acid was converted within the flame to carbonic oxide, with consequent absorption of heat. The flame was thus cooled. Removal of the carbonic acid would be more costly than additional carburetting to compensate for the effect of the carbonic acid. But its removal had now no longer any particular value; for with the Welsbach burner, the carbonic acid present, strangely enough, was distinctly favourable. For instance, gas containing 3·9 per cent. of carbonic acid gave a light of 65·4 candles; while the same gas, after the carbonic acid had been removed, gave only 56·5 candles. This result could be explained by the fact that the Welsbach burner had a somewhat too little supply of primary air, and consequently an increased proportion of carbonic acid apparently improved the air supply. It was not, therefore, necessary to be so careful with regard to the amount of carbonic acid in the gas; and this point became especially important when water gas had to be added to the gas. The illuminating power in flat-flame and argand burners was no longer a rational measure of the illuminative value of the gas. Such a measure was still to seek; but provisionally the calorific power of the gas might serve the purpose.

Carbon disulphide had no effect on the illuminating power of the gas, as its amount was too small; but its removal became of importance, because of the application of gas for heating purposes. Carbon disulphide, on combustion, formed sulphuric acid, which corroded the apparatus. The decomposition of carbon disulphide with water first began to take place at about 390° Fahr. It might be thought the formation of carbon disulphide in the retort increased towards the close of the distillation, when the coal was no longer evolving moisture; but this was not the case, as the ratio of carbon disulphide to sulphuretted hydrogen was not actually greater towards the close of the distillation. Pippig and Trachmann had proposed to absorb the carbon disulphide by means of a solution of aniline in alcohol. Heavy tar oils also would take up carbon disulphide. Practical trials would perhaps be worth making; but the amount of carbon disulphide was very small, and hence would be absorbed with difficulty. Heating the gas with steam would appear to be the most promising mode of procedure to try.

It would scarcely be possible to find a method of removing carbonic oxide; but the gas industry had striven with good results to avoid ill-consequences from the carbonic oxide present in illuminating gas. The opinion which Herr Oslender, of Düsseldorf, had expressed at the last meeting of the German Association of Public Hygiene—to the effect that gas-works had no longer a right to exist on hygienic grounds—should not therefore remain uncontradicted, more especially as the Association before whom the statement had been made was an important one. Although the attack had been made quite unexpectedly, it had been at once generally repulsed at that meeting. The view taken by Herr Oslender had rested on the entirely false assumption that the so-called "unaccounted-for" gas was wholly gas which escaped through leaks in the mains. But the unaccounted-for gas actually was calculated as the difference between the reading of the station meter and the readings of consumers' meters, after estimating the consumption for public lighting. This difference, however, could, apart from the condensation of moisture, be explained mainly as due to the difference between the temperatures at the station meter and at the consumers' meters. A difference of 5·4° Fahr. would correspond approximately to a difference of about 1 per cent. in the volume of the gas. But even if the so-called unaccounted-for gas were taken as actual escaped gas, a simple calculation would show that the quantities of carbonic oxide, which would consequently be introduced into the air, would be of such a degree of minuteness as to be negligible. Only lack of knowledge of the actual conditions could have led to the conclusion which Oslender had arrived at.

At the close of the lecture, Dr. Leybold, of Hamburg, called for an expression of thanks to Professor Bunte; and this was heartily accorded by the audience. Dr. Leybold then observed that he had found the addition of air more satisfactory and cheaper than that of undiluted oxygen; but it was necessary not to overdo the addition, nor to allow the material to remain in the vessels too long, as it then became dry and hard, and could be removed from them only with difficulty. The dried material absorbed water again very charily; and when the oxide had become overdry, the absorption of cyanogen scarcely occurred at all. In Germany, there was no obligation to remove carbon bisulphide from the gas; but it was advisable, by a proper selection of the coal, to keep the amount within a certain limit. He also vigorously protested against the statement of Herr Oslender. Dr. Bueb, of Dessau, said that he would recommend that the air should not be added prior to the washing of the gas; and he gave further a number of interesting particulars of chemical observations on the addition of air to gas. According to his researches, heavy tar oils did not absorb any carbon bisulphide. Herr Burgemeister, the Manager of the Celle Gas-Works, said he had found difficulties in the working of gas-engines when more than 1½ per cent. of air had been added. The air could be admitted in a very simple manner, and no special apparatus was required. The pressure after the scrubbers could be utilized in order to introduce air at the washers by means of special injector nozzles. He said, further, that he had found that stoppages in the ascension-pipes could be entirely avoided by sprinkling them with water. Dr. Becker, of Frankfort-on-the-Maine, said that separation of water in the second vessel did not take place if the amount of moisture in the oxide in the first vessel did not exceed 20 per cent. The increase in the temperature amounted to only 27° Fahr. at the most, if the air was added in the proportion of 1·5 per cent. of the gas. Herr Klönne, of Dortmund, pointed out that the same quantity of oxide, when disposed in several thin layers, sufficed to purify a greater volume of gas than when it was in one thick layer. He recommended splitting up the stream of gas into two as it entered the vessels, and the use of two advance purifiers and three check vessels.

DEMOLITION OF THE PIMLICO GAS-WORKS.

Our bright little contemporary "The Coloured Pictorial" has favoured us with the accompanying illustration, which presents a scene in the removal from the face of the earth of what have been known as the Pimlico Gas-Works of the Gaslight and Coke Company. In a paragraph accompanying the picture, the Editor

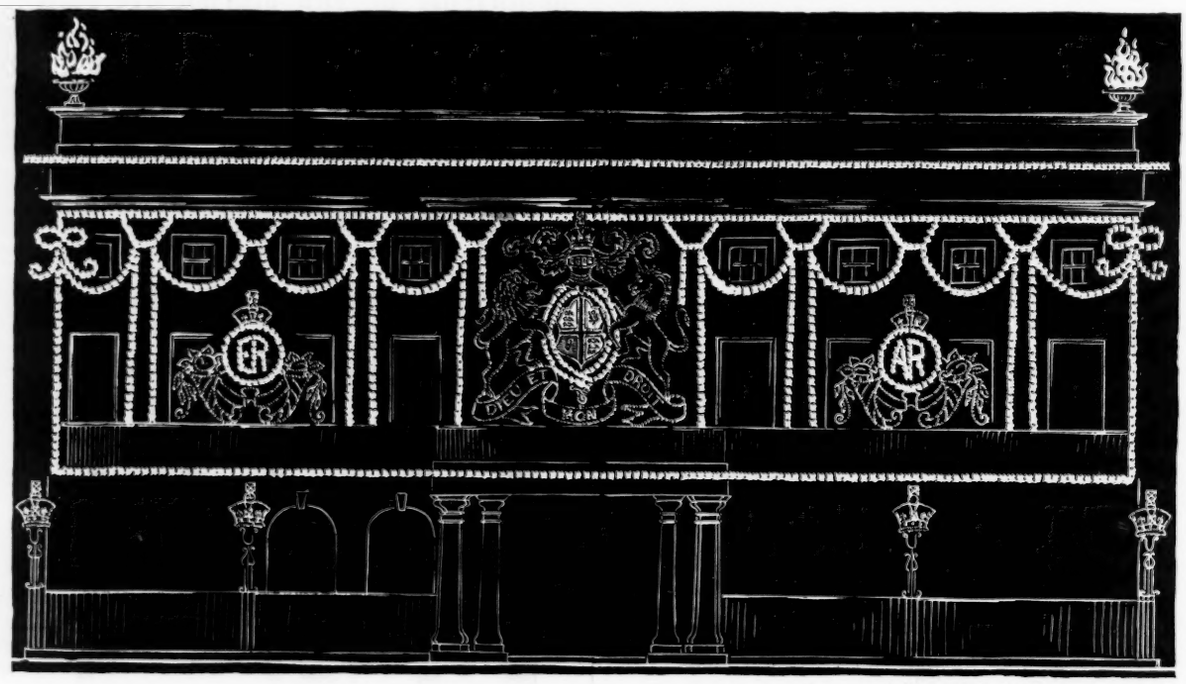
says: "The demolition of the Pimlico Gas-Works has been rather a ticklish job. A glance at our illustration will at once give one an idea of the danger attendant on the undertaking. A steel cable was first attached to the top of each gasholder column, one by one, and the huge bolts—each 4 feet high—were disconnected. The cable ran round the drum of the donkey engine, which by main force hauled the columns down. Each column stood 90 feet high, and weighed about 25 tons; so that there was plenty of noise and dust when the giants fell to the earth."

A NOTEWORTHY EXAMPLE OF GAS-JET ILLUMINATION.

In Burlington Gardens—out of the main thoroughfares, and consequently in a position in which it may be lost sight of by gas engineers without attention being specially drawn to it—will, when the word is passed for the lighting up of the night decorations in London, be found one of the best pieces of illuminative gas-jet work in London. It is at the West-End Branch of the Bank of England; and the praise for the whole design and execution is the due of Messrs. William Sugg and Co., of Westminster. There has already been a tentative lighting up of the installation; and we are sufficiently assured of the effect to embolden us to say that, for brilliance and general attractiveness, this display will be found second to none among the illuminated public buildings of London. The illustration prepared from a sketch of the work will give an idea of its character; but it only faintly conveys to the eye the gorgeous effect of the actual lighting itself. The character of the work is very appropriate to the architectural features of the building; and the rich golden light is certainly representative of the class of business carried on within. There is a pleasing harmony and chasteness about the design—the magnificent and artistic central and side figurings destroying altogether any semblance to severity in the outlining work. We must say, too, that we have for façade work a lingering liking for this open type of gas illumination, which gives greater scope to the imagination of the designer than the newer, and yet already so much overdone, illumination by means of gas-jets and glasses. Besides this, there is a boldness about this open-jet method of treatment which is not to be obtained by other means. The uniformity of the jet-and-glass type of work and the little diversity in colour rather tire one; and to get to an example, such as we have here, of illumination on the old-fashioned gas-jet principle as modernized is indeed an agreeable change.

The building is 83 feet long, and 44 feet high; so that Messrs. Sugg and Co. had ample room for the exercise of their inventive faculty in artistic illumination. Running the full length of the building near the top is a row of star-jets, above which at the ends and at the roof level are a pair of flambeaux. Beneath this striking line of light is the central and main part of the illumination scheme. It is comprised in a border of star-jet lights also occupying the full length of the building. Six double columns of jets divide the space into seven panels, the largest of which is in the middle, and the next in size are the centre panels on either side. Suspended from the tops of the columns and the upper border line are festoons of lights, which give one a representation in fire of drapery hangings. A splendidly designed coat of arms forms the centre-piece; and it is indeed a work of art. The side designs are also beautiful pieces of work, and both are similar in character. They consist of circles of lights, bearing crowns and supported by cornucopia—two to each. In one circle there appear the letters "E. R.," and, in the other, the letters "A. R." Below this large device are four crowns.

Nearly all the work is carried out by star-jet burners; only here and there (where the design would not permit of stars) are single jets used. But these star jets are a feature of the installation; and they are indeed very effective for the purpose. They are obtained by burners having a steatite head with a single hole drilled in the top and four lateral ones—thus giving five independent jets. Altogether, reckoning the star lights as consisting of five jets, there are no less than 60,000 jets in this piece of illumination. Very little trouble is entailed in the lighting up—the ignition of one jet carrying the light over each separate part of the device.



PERSONAL.

Mr. Fred. C. Dyson, of Newcastle, Staffs., has been appointed Chief Clerk in the Loughborough Corporation Gas Office.

Mr. W. J. Moore, who has been connected with well-known lighting firms, and has had special experience of the incandescent light trade, has joined the Board of the General Incandescent Company, Limited, and will in future take an active part in the business.

In connection with the recent inspection of the extensions at the Stoke-upon-Trent Corporation Gas-Works, to which reference is made in another part of the "Journal," a pleasant incident in the proceedings following the luncheon at the residence of Alderman Geen, the Chairman of the Gas Committee, was the presentation to him of an illuminated copy of a resolution passed by the Corporation at their last meeting, thanking him for his valuable services in the above-named capacity, and congratulating him upon the completion of the gas-works extensions so efficiently carried out under his supervision. As a mark of esteem from his colleagues, Alderman Geen was also presented with a massive silver tray, tea-kettle, and coffee-pot, made to harmonize with a tea service in the recipient's possession.

Mr. Albert Ford, the late Manager of the Singapore Gas Company, has arrived in England; and he will be heartily welcomed by his professional friends. On the Wednesday prior to his departure, he was presented with an address and a handsomely chased silver bowl, as a token of the esteem of the staff, with whom he had been connected for several years. On the occasion, Mr. Hallaway, the new Engineer, took the chair; and there were about 150 persons present. Mr. Valuppillai read the address, after which it and the token of remembrance, with a bouquet, were presented to Mr. Ford. In his acknowledgment, Mr. Ford warmly thanked the staff, and said he had always tried to be a just master to them as well as their friend, and expressed a hope that they would get on as well with his successor as they had with him. A copious "christening" with rose water from the gift bowl, and hearty cheers for Mr. and Mrs. Ford, brought the interesting ceremony to an end.

A little bit of personal history came out at the annual excursion of the Beckton Gas-Works foremen last Saturday week. Colchester was visited, and dinner was served at the Red Lion Hotel. At the head of the table was Mr. H. Iago, the new Engineer and Manager of the Beckton works. Some remarks made by Mr. Wren, the Vice-Chairman, brought to mind the fact that Mr. Iago once before occupied a position at Beckton; and

the men are proud and glad that he is with them again. In responding to the toast upon which these remarks were made, Mr. Iago said he did not previously leave Beckton from choice. He had grown to like those with whom he had been associated. It was a wrench to part; but it had turned out a good thing for him. One could never look far enough ahead. When the opportunity came to return, he did not feel that he was coming among strangers. For sixteen years he was at Fulham, and there made many friends. It was also a wrench to leave them; but he found compensation in returning to old friends.

At their last meeting, the Board of the Tottenham and Edmonton Gas Company had a very pleasant surprise in store for Mr. JAMES RANDALL, the Secretary of the Company. Mr. Randall has been with the Company for upwards of half-a-century, and the Directors were desirous of marking their great appreciation of his services. The Chairman (Mr. Corbet Woodall), after a very touching and affecting speech, in which he referred to the admirable manner in which the Secretary had discharged his duties for so many years, and the high regard he had won from the Board and shareholders, as well as others connected with the Company, presented him with a handsome and massive silver bowl, mounted on an ebony base relieved with silver and a tablet, inscribed as follows: "James Randall, Esq. A Memento in appreciation of prolonged, faithful, and highly-valued service to the Tottenham and Edmonton Gaslight and Coke Company. June, 1902." It was accompanied by a cheque for 100 guineas. Mr. Randall, in thanking the Directors, replied very suitably and feelingly to the kind remarks which had been made.

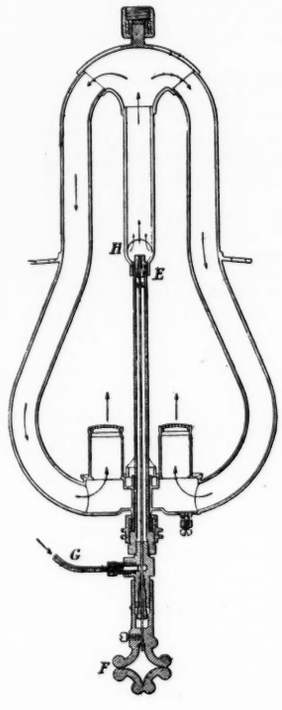
OBITUARY.

We regret to announce the death of HEER CORNELIUS W. SNELLEBRAND, which occurred at Rio de Janeiro on the 31st of May, in his forty-fifth year. He was born at St. Maarten, and after studying at the Polytechnic School at Delft, began to practise as a civil engineer, building, among others, the gas-works at Coevorden and Meppel. In 1893, he went to Rio de Janeiro as Second Engineer of the gas-works there, and became Chief Engineer in 1896. While in Brazil, he carried out satisfactorily several improvements at the municipal gas-works at Bahia.

NOTES.

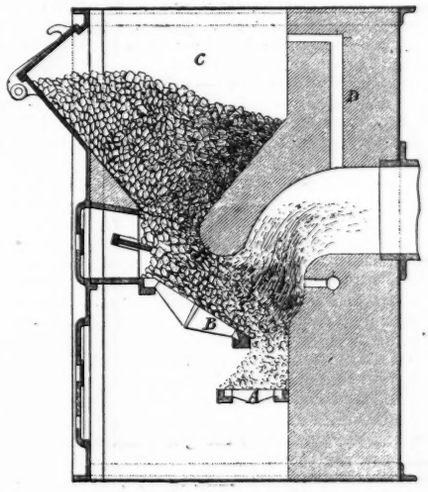
The Washington Alcohol Lamp.

In the course of the article on "Lighting at the Paris Alcohol Exhibition," which appeared in the "JOURNAL" on the 17th ult., it was mentioned that the dome of the Salle des Fêtes was lighted by lamps of the French Company La Washington—viz., the Washington lamp proper, and the Kornfeld, or Russian Imperial lamp. The former, which is shown in the accompanying diagram, was originally designed for petroleum; but it has since been adapted to burning alcohol—a lamp of 500-candle power, consuming about 0·5 gramme, or 1-60th of an ounce, per candle per hour. The alcohol or petroleum is led by a very small copper pipe G, under a pressure of about 4 kilogrammes per square centimetre (56 lbs. per square inch), to the bottom of the vaporizing tube, which ends in an elongated conical seat, terminating in a small aperture E, more or less closed by the regulating needle, actuated by the handle F. This needle passes through a stuffing-box below and some asbestos packing above. Just above the junction of the pipe, the vaporizing tube is connected with the body G of the lamp by a joint-piece and nut; and it is also connected a little higher, in a similar manner, with the vertical tube forming part of the body. The alcohol or petroleum, led up by the pipe G, passes into the vaporizing tube, where it is heated, on starting, by the flame of a little alcohol burning in a cup between the two bunsen burners shown, but afterwards by the heat given out by these burners. The liquid rises in the tube owing to the action of heat, and issues, vaporized, through the small aperture E, where it becomes mingled with air entering by two inlets. The mixture passes up into the tube above, after which it descends by the curved lateral branches to enter the bunsen burners. The reservoir holding the oil or spirit supply may be placed at any desired distance from the lamp; and if its height above the burners is not sufficient to cause the liquid to reach them by the force of gravity, the necessary pressure is given by a small pump.



A Gas-Coke Stove.

In view of the competition of anthracite and "lean" coals with gas coke as a domestic heating agent, M. Henri Martin, of St. Quentin, constructed a stove to facilitate the use of the last-named material, and it was brought under the notice of the members of the Société Technique du Gaz en France, at their last meeting, by M. Frère. It is shown in the accompanying diagram. Sufficient coke to last twelve hours is put into the



receptacle C; but combustion takes place only on the horizontal and inclined grates A and B. The gases which may accumulate in the receptacle are conveyed away by the pipe D. An air inlet below, which may be regulated as required, ensures the combustion of the carbonic oxide, should any be produced. The draught of the stove is governed by dampers placed upon the door; and the chimney is constantly open.

Electricity Supply for Illuminations.—In the course of an illustrated article on "The Coronation Illuminations" which recently appeared in the "Electrician," it was suggested that had all the electrical illuminations been called into simultaneous use, as originally intended, their effect would not have raised the station load anywhere to more than the top winter load. Our contemporary thinks the particulars given in the article in the "JOURNAL" last week, on "Effects of Holidays and Illuminations on Gas Consumption," possess no little interest for electricity supply engineers, as, broadly speaking, they showed that, in many important places where gas illuminations was exhibited on an extensive scale, the day's consumption did not exceed that for the corresponding day in 1901. The "Electrician" thinks "this should encourage electricity supply engineers in the belief that even a large amount of current for electric illuminations would not overtax a properly equipped station, nor put any severe strain on the station staff."

North British Association of Gas Managers.—The forty-first annual general meeting of this Association will be held in Perth on Thursday and Friday of next week, under the presidency of Mr. John Wilson, Manager of the Tradeston Gas-Works of the Glasgow Corporation. We learn from the programme issued by the Secretary (Mr. R. S. Carlow) that the business will be transacted in the City Chambers, and will consist, in addition to the usual routine matters and the President's Inaugural Address, of three papers: "The Use of Lime and Oxide of Iron in Purification," by Mr. T. Lighbody, of Renfrew; "Modern Retort-House Practice," by Mr. W. B. M'Lusky, of Perth; and "Some Experiences with Condensing Plant," by Mr. W. Currie, of Alexandria. There will be an interval at midday to enable the members to take advantage of the invitation of the Provost and Magistrates to inspect the new gas-works, where light luncheon will be served. At the close of the business, the members and lady friends will dine together at the Salutation Hotel; and subsequently a visit will be paid to the historic Palace of Scone, the gardens and grounds of which will be open to the party by the kindness of the Earl of Mansfield. On Friday, there will be an excursion to Drummond Castle and its lovely gardens, with dinner at the Royal Hotel, Crieff. Given a fine day, this trip will prove a delightful finish to the meeting; for the grounds of the castle afford an example of gardening probably unequalled.

COMMUNICATED ARTICLE.

GAS MATTERS IN THE UNITED STATES.

Another Important Decision.

The notion held by many lawyers, that the public services companies in the United States may be held to strict accountability for the injuries done by them, either in the way of performance of their chartered privileges or by negligence in performing them, especially this latter, has been much strengthened by a decision in Minneapolis. A florist's stock was killed by the leakage of gas from a main into the ground in which the plants grew. He asked for damages, and won his case. The Jury gave him damages as prayed for. There have been a number of these suits during the past twenty years or so. Most of the time they have been in favour of the gas companies, on just what ground it is not clear; but of late the decisions have been against the companies, and in favour of the plaintiffs.

Usually the defence has been—at least in a great number of instances, if not usually—a denial of the facts. To this would be added, as lesser pleas, contributory negligence, failure to give notice, unavoidable accidents, and obedience to all the precautionary enactments. This plea—that the precaution required by law had been taken—has been successful in a number of suits; the contention being that "if they (the gas company) have taken all the precautions required by law, they must be held blameless of any criminal, and therefore impugnible, negligence." This was the opinion given by a lawyer in this city specially prominent in the pavement suits. In this gas injury case, the defence seems to have met a hostile court. But "nothing is really decided by a lower court if the beaten party can afford to go up with the case, as they probably will do; for if they do not, this case will seriously influence future decisions," said a lawyer who is in it, "on this question of responsibility." He is in some way connected with the "gas leak suits"—the question of how far the gas companies are to be held responsible for the damage done to asphalt pavements by the gas which escapes from leaks in the mains in the streets.

An Interesting Experiment with a Mantle Light.

A short time since, I saw the exhibit and results of a research which will soon be sent to you for publication—at least, I have convinced the author, or believe that I have, that the columns of the "Journal" are the proper place to publish his results; and he has promised to send them. He is willing that I send to you a *résumé*, so I make this note.

An investigator, not quite unknown, has been experimenting with a high-power burner—one of the Kern pattern—and sundry mantles made from sundry materials. The results are most satisfactory. He has determined certain facts in relation to the destruction of mantles, demonstrating that they are destroyed in part by the attrition by the solid particles of carbon in the flame, and that they are actually made volatile at high temperatures. This he has done by study with the spectroscope.

The first result is to obtain a demonstration that the mantle light is in all respects equivalent to the sun in its physics—that is to say, all the remarkable phenomena obtainable spectroscopically from the sun are obtainable from the mantle light *seriatim*. Therefore, it is contended that, in some degree, the sun must compare in its physical condition with the mantle light. The condition may not be identical; but it must in a way be similar. I do not intend to say that the sun has a combustible portion and an incombustible portion, although this is not quite impossible, if we understand by combustion the combination of gases in such condition as to produce intense heat and light, regarding the fact of the combination as the important chemical and dynamic fact, and the heating of some solid—probably these identical earth oxides—to luminosity by this union, whatever it may be. Put in the form of *legendre*, it is possible to frame the proposition thus: "I say that, as in the mantle-light the intense heat obtained by the union of carbon and hydrogen, in combination with oxygen, heats an incombustible solid to intense incandescence, so in the sun the heat, generated by the union of certain chemical elements, produces heat so intense as to render an incombustible solid incandescent." With this proposition, the similarity ends; for while in the case of the gas-flame the fuels are exhausted by the act of combination, in the sun they are perpetually renewed by the destruction of the chemical union as fast as made. For this reason, he says "The sun is to us as it were eternal."

The remarkable series of observations on which these statements are founded is as follows: If a mantle heated by a Kern burner be examined with a satisfactory spectrometer (spectroscope with apparatus to locate the lines) the following are seen:—

(A) A splendid continuous spectrum strictly comparable with the continuous spectrum of sunlight.

(B) A spectrum of dark lines crossing the above in the same way as the dark lines cross the spectrum of the sun.

(C) A spectrum of bright lines on a black ground, which is a copy of this one (B) with the lines reversed. That is, they are the spectrum of incandescent gases and not of a solid—the spectrum of the envelope.

The lines found in these two spectra have been compared each to each; and the results are as follows: "In this spectrum of bright lines," says this investigator, "we find the spectrum of hydrogen, nitrogen, oxygen, and carbon, together with those of the materials of the mantles. In the chromium aluminum mantle, for example, we obtain the lines of these metals. In other mantles we obtain the spectra of the rare earths; and by establishing their identity, it has been fully demonstrated that every substance known is sensibly volatile at the temperature of the mantle in the Kern burner flame, be this what it may." He adds: "Judging by the results obtained, we must regard carbon as a substance which, in the gaseous form, has many atoms each of a different valence and of a different number of ions. These carbon-ion-groups, or carbon atoms, also unite variously, in ways depending on the temperature, to form groups, each of which has its own special spectrum; and these groups are not absolutely identical in the same flame, nor are the materials the same in all parts of the same mantle flame."

Study made with the view of bringing out the fact—not to prove a theory—shows that the often-stated law that you cannot heat a body hotter than its evaporation point holds true here also. Investigation shows the temperature and corresponding luminosity of the mantle substance increases with the volume (so to say) of the heat rather than its temperature; but no volume of heat will increase the radiance of the mantle above a certain point, which, in these studies, is indicated by a certain prominence of the bright line spectrum. To make a comparison of small things with great, the mantle will absorb heat—changing its wave lengths to those of light until the inter-molecular disturbance reaches such a point that the cerium begins to evaporate at a certain rate to which the words "somewhat rapidly" begins to apply.

Judging these studies from the standpoint of my own investigations, I am inclined to say that the temperature of the mantle is higher than that of the flame always, and at times may be very much higher. There also seems to be some not clearly defined relations between the temperature of the flame and that of the mantle. This is illustrated by the relations of the bright line spectrum under the influence of the ordinary burner, the Kern burner, and the Kitson burner, in which the volume of heat bears a very definite ratio. But the absolute temperature of the Kitson burner must be higher than that of the Kern, because in it certain hydrocarbons can be shown to be burned—that is, to undergo molecular disintegration—and then to unite with oxygen, which, it can be readily proved, do not thus disintegrate and unite in the Kern burner. At some future time, maybe these experiments will find a place in these pages.

The Part played by Cerium.

In the address delivered by Professor E. D. Campbell to the Michigan Association, there are certain words on the mantle light which show the way in which the present notions are tending. He says, speaking of European work: "As was explained in a (our) paper yesterday, they (the Europeans) maintain that the function of the cerium oxide in these mantles is in some way to enable that mantle to attain a higher temperature than if the cerium were absent. I think that we have completely proved that this is not the case; for we have taken the mantle containing 1 per cent. of cerium oxide, compared it in temperature and in luminosity with a pure thoria mantle, and have found that a pure thoria mantle, although it may be even higher in temperature than the mantle containing 1 per cent. of cerium oxide, still emits very much less light. Therefore, the temperature cannot be the one factor."

Is not this simply delicious. He "has compared the temperature" of the two mantles, has he? He says so; but there is not one word to show it in his paper, nor is it easy to conceive that such a comparison can really be made. Granted, he may have measured the amount of heat made sensible; but in this very act he shows he has lost the clue. If the thorium mantle radiated more heat than the cerium mantle—which is no doubt a fact, since all experimenters are of this opinion—it is no sort of proof that it is really hotter than the cerium mantle, but rather the reverse. It may be argued that either mantle is higher in temperature than the other, and proved either way by the results of any given experiment according to the postulate which goes before it. This has actually nothing to do with the case, which is really this: When a certain amount of force is expended in making a mantle luminous—call this force, if you like, F—a part is converted into intra-molecular work, I—and a part into extra molecular work, E. Now in every case the sum of these two are equal to the amount accepted by the mantle—*i.e.*, F—I and E; but $\frac{I}{E}$ is never a constant. Not only is it not a constant in respect to the two bodies thorium and cerium, but it is not constant for either one for any two named temperatures.

There is another relation also which must be remembered. Any earth becomes more and more luminous as it approaches the point at which the continuous spectrum gives place to a line spectrum; and here, again, it is very unwise to use this word temperature to measure the inter-molecular agitation, for we have no reason to think it any such thing. Temperature is the amount of inter-molecular motion made sensible as heat measured against a standard amount on the basis that $T = \frac{H}{h}$—a fact

which is seemingly very readily lost sight of when discussing this problem. But the best proof that the thorium is hotter when mixed with cerium is to be found in the simple fact that, if a mantle weighing n. mgs., made of pure thorium oxide, be heated by a given flame, and then a mantle weighing n. mgs. of pure thorium with $\frac{n}{100}$ of cerium oxide added heated in the same flame, the lines-spectrum of thorium will appear in the second case and not in the first, which is *prima facie* a demonstration, and under all conditions an argument, that the second mantle is actually more disturbed than the first by some and certain of the vibrations of the kind we call heat, and in this sense (and this is the sense in which the words are used in the discussion) is hotter than the first one, the pure thorium mantle. In this same sense the greater luminosity is due to its being much "hotter," be its temperature higher than before, or not so high. It would seem as if the Michigan Professor had made a dragon after the methods of the Christmas pantomime, for the sake of slaying him in the good old way. He may have convinced his audience that "them European fellows ain't much account;" but I misdoubt if he will convince the European fellows.

The Real Problem.

It is worth noting that, while the author of the paper referred to seems so willing to accept the results published in his journal reprinted paper as final, the men in New York have no such feeling about their work. In some points it fully agrees with the Ann Arbor work; in some points it fully meets it face to face as disagreeing; but in no instance does any cause exist obviously by which the difficulties of the question can be explained. The physical problem is not the question of temperature, about which no one cares anything, even as a matter of academic discussion, outside a very limited circle; but the real question is to obtain a maximum illuminating efficiency as represented by expenditure of gas per candle power. This important point has not yet received the attention which it most certainly merits, as has been well said "when the proper adaptation of all parts of the machine to each other are obtained, it will be found that the amount of gas consumed per candle power is the same for all sizes of settings, be the fitting a miniature burner for use on the writing desk of a boudoir, or a street-lamp, or a lighthouse."

In view of the great variation, in candle capacity of various fittings, one is almost forced to inquire How did it happen? The real conditions are most certainly not understood; but it is almost equally certain that the true empirical solution will be reached long before the scientific one. Undoubted as this fact is by the few, it seems to make no impression on the many; and among the latter are the mantle industry's managers. "We have not yet the best burner for the mantle to use at the desk; for the one on the desk, far from running a close second to the Kern fixture, does not come near to it. The candle power of the desk lamp, expressed in terms of the gas consumed per square inch of the mantle, is *only* 3·7 times the consumption of a large single-mantle Kern."

This is by no means what it should be, and brings me directly back to the demand of Mr. W. C. Clarke—"I want a burner and a mantle of such size that, with the efficiency of the Kern and corresponding gas consumption, it shall give not more than 25-candle power." "Such a mantle," as Mr. Clarke has well said, "need be only a fraction of the one in common use in size; but it must be its full equal in efficiency." This is just the very point of rock in which the run of the inventors have wrecked their barque and their hopes in one and the same instant. "The candle power per square inch of functionating fabric, in terms of the highest attainable efficiency, must be determined once for all; and then the inventor must lay himself out to reach this in all installation."

If 12 square inches of properly functionating mantle will give 600-candle power—that is, will give 50-candle power per square inch, and that it will give this I do most certainly know, having measured the candle power of such properly functionating fraction of the mantle again and again—then this supposition being true, to use a mantle containing 12 square inches for the purpose, and with the intent to give only 5-candle power per square inch, or 60-candle power per mantle, is an act of most absurd and quite gratuitous foolishness. At least, this much is an axiom; and since the practical men—the administrators of the gas industry—tell us that the thing they (the said gas-works men) desire is not to give 600 but 50 candle power per mantle in the domestic trade, it follows as a necessity that the item now wanted is a burner with a miniature mantle, the whole fixture of miniature size, giving the said 50-candle power. The size of the mantle should be from $\frac{1}{3}$ to $\frac{1}{16}$ inch in diameter at the bottom of the cone, and the cone should be about one inch high. The original discoveries on which the mantle light was founded were made in England; but no Englishman had the "dead-hang-on" and "imagination"—shall I add "appreciation of the future?"—to develop them. It was left for a German to develop the discovery; and the English-speaking race has paid him tribute ever since. Is it, I ask, to be left to a German to develop the proper burner and proper mantle for domestic use?

There is no use in pretending that the problem is incorrectly worded; it is not. It is as exactly set as problems can be. Mr. W. C. Clarke stated the problem five years ago; and when the "baby mantle" fixture of De Lery's design came out, it was but the development of Mr. Clarke's notion, proposed to De Lery by him, as a problem to be solved. That De Lery did not understand what Mr. Clarke wanted was their joint misfortune. Later, Mr. Clarke induced the Kern people to make for him a mantle of the right shape and still twice larger than the theory; and against all expectation Mr. Clarke failed, because his burner was insufficient. His need was a miniature Kern burner, made exactly on the lines, and exactly in the proportions, of the Kern or other such high-power burner, and for choice to "Kalamazoo" design. Had this been done—and Mr. Clarke had ample information as to what was the true need that can neither be denied nor avoided—we would have seen here in this city not the "De Lery's fiasco," but "Clarke's success." Is there not enough courage and ingenuity in England to accept this task and to carry it into completion—to produce a burner equal in efficiency and one-twelfth the size of the present Kern? When this is done, and not until then, will the development of the mantle light be complete.

The First Fruits of the Strike.

When last the English coal trade was convulsed by disorderly conduct and foolish self conceit of knowledge of their own best interest among the miners, it was to your columns, and not to those of the Daily Press, that we in this country who were so fortunate as to be able so to do, turned for information of the present, for speculation, and foresight of the future. For this reason, I send you the salient facts, so far as they go, in this one. An attempt was made a short time since to open the washery of one of the smaller mines. The mob overawed the forces of law and order. The matter did not reach the judgment of battle; for the men who should have been at hand to command the law forces were miles away. The few policemen who came in contact with the mob were beaten; a reinforcement coming to their aid was bidden "To go away peaceably," and went. The first struggles are over; the first violence has been done. The representatives of law were one score of men armed with short clubs and revolvers, which they are forbidden to use "unless ordered," and no order came.

The mob were armed with long clubs, revolvers (which they were not slow to display and knew how to use), and also with some hundreds of magazine rifles, carrying not small sporting but fighting cartridges, and numbered not less than 2000 men. With them were at least as many women, who are more dangerous than the men; for in any disorder they form the front rank, the column of assault, and such is the false reverence for women in the United States that even soldiers (Militia) have been known to prove recreant to discipline and duty when a female firebrand—the woman murderess of their fellows—must be handled as a foe to law and order. Behind a mob of armed women, finding shelter in the shadow of their skirts, nearly any band of rioters is safe. If a shooter volley fires to kill he must reach the women first; and behind this inevitable line of women the rioters were as safe to-day as the Persian soldiery behind their cats at the battle which determined the fate of Egypt. Thus, protected by the American pseudo-reverence for the petticoat and the weak fears and falsity of the authorities, the rioters were victors.

Will they be victors in the next conflict—the conflict which may come to-morrow and any way must come in a few days, or the fate of law of the land is certain. Hardly. Another effort will be made to give work to the washery men. Either they will go to work in peace, and the strike will be ended in a few days, or a conflict will be precipitated which will widen day by day, and of which no man can see the end. Here in New York just now, in hotel lobbies and in other places where men come together in assembly rooms and clubs, the one subject on every tongue is: "Will the State troops be equal to the need, or will the General Government be called on?" A perfectly reliable correspondent says: "The men here are discussing the march of Coxey's army; and they propose now to march 25,000 armed men to Philadelphia and 50,000 to Washington to convince the Government how many, and how powerful they are, and that they mean "business"—that they "intend to have their way." I pray Heaven they may. Then maybe we will find out who owns these mines—to whom the responsibility of management belongs. We played with them before when we should have punished; now they will do more harm than two prosperous years will repay."

Such is the outlook at present. How will it be by the time you get this letter? All disorder ended and peace and quiet begun again? It may be so; but, indeed, I do not dare to hope for such a solution—rather I look for disorder and a bloody conflict.

Society of Chemical Industry.—The rate of increase in the membership of this Society has been normal during the past year. There were 332 new members elected, as compared with 335 in the previous year; and the losses were 181, as against 159. The number of members on the register is now 3786, as compared with 3635 at this time last year. These figures were included in the Council's report, which was presented at the annual meeting in Liverpool last week. In contributions to the Society's proceedings, there is no dearth; and there ought not to be with such a membership. In the official organ of the Society last session, there were published 110 original papers, as compared with 80 in the preceding year.

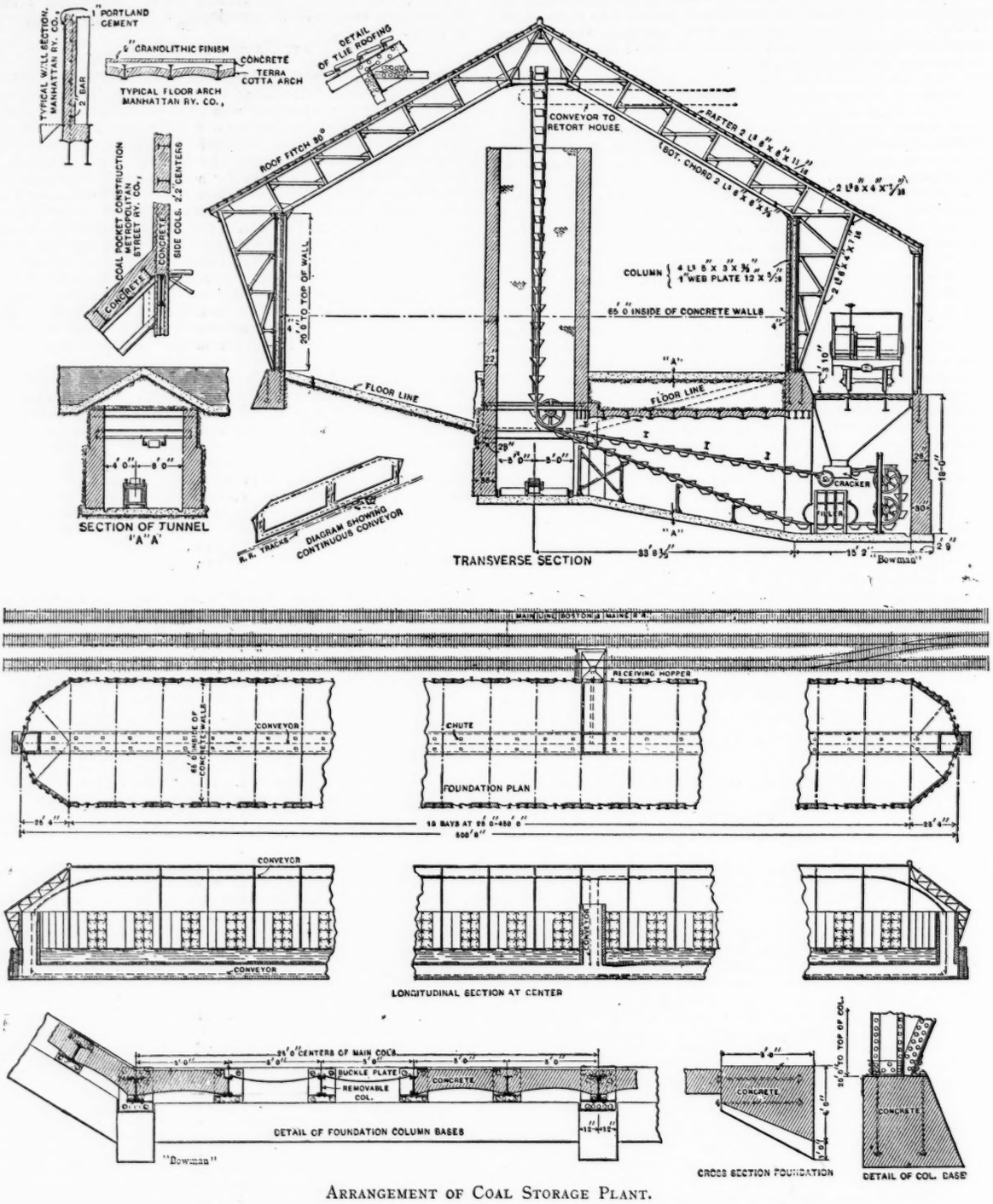
TECHNICAL RECORD.

A STEEL AND CONCRETE COAL-STORE.

At the recent Meeting in Boston of the American Society of Mechanical Engineers, Mr. FRANKLIN M. BOWMAN, the Engineer of the Lowell (Mass.) Gas Company, read a paper in which he described the coal storage plant of the Company, and dealt generally with the construction of such plant. An abstract of the paper has been published in the "Engineering Record," to which we are indebted for the following particulars and the diagrams illustrating them.

Previous to the building of the new storage plant, old shallow wooden sheds were used, some of which were very antiquated. No modern system of conveying machinery of any kind was employed, and the cost of handling the coal was necessarily high. When it became evident to the management that large improvements would have to be made in all parts of their plant, to reduce the cost of manufacture and increase the output, they were at first inclined to allow the storage buildings to remain as they were, except that coal-handling machinery over the old storage was proposed. Having in mind, however, their probable future requirements, and considering the limited space they had for remodelling and extending the other parts of their plant, they finally decided to put up storage plant to hold 25,000 tons—being about twice the previous capacity.

It will be noticed by the plan that the coal storage building runs just parallel to the Boston and Maine Railroad; the track



ARRANGEMENT OF COAL STORAGE PLANT.

immediately adjoining the shed being on the Gas Company's property. This arrangement allows ten cars to be placed on the siding at one time, and with the unloading hopper in the middle of the length of the building, one-half of these cars can be loaded. Unloading and moving of cars can consequently be carried on continuously, without shifting engines. There would have been some advantage in placing the building at right angles to the position decided upon, as, with one end of it against the railroad siding, the coal conveyor would have had a straight run, so that it would not be subject to the extra wear and tear, and require

the constant additional power necessary to pass round the turns of the tunnel leading under the unloading hopper. Moreover, under this construction, the concrete shafting in the centre of the building would not be required. It was necessary, however, to locate the buildings in the position decided upon because they could not disturb the present coal-sheds and retort-house, as it was necessary to run continuously while the new buildings were being constructed; and, further, the general scheme required the space of the old coal-sheds for other improvements.

In the design of the plant, every effort was made to obtain not only a useful and permanent, but handsome structure, if a coal-store can be called handsome. It is a steel-frame building with concrete walls, foundations, and floor, and with a tiled roof resting upon steel purlins. It is fireproof throughout, well ventilated and lighted, protected as much as possible from corrosive influences, and arranged so that the pockets can be expeditiously emptied should there be fire from spontaneous combustion or other causes. The steel truss is braced from the outside of the building, with the main columns vertical. With this construction, these columns, with the concrete wall, form the bulk-heads for the coal. The inclined back leg, forming the brace at each column, is outside the store, and supports the overhang, as shown in the cross-section.

A further reason for the use of this construction was that an inclined floor, with a tunnel in the centre of the building, was required, and these conditions made it impossible to put in tie-rods across the building to unite the bases of the main columns, and thus take more of the wind strains and the pressure of the coal against the sides of the building. The shallow truss with its bottom chord parallel to the top chord makes it impossible for the coal to reach the truss at any point; while the channel tie across the centre of the truss, near the ridge, forms a support for the conveyor. The building is without a ridge strut, but the two girders on either side of the ridge answer the purpose, and at the same time form a support for the conveyor, as well as a guard for the foot walk. The shallow inclined truss, with the tile-glazed roof, and the concrete walls and floor, give the inside of the building a neat and substantial appearance, while the overhang on the sides, the tiled roof, and the octagonal ends make the exterior appearance pleasing.

The floor and foundations of the structure are made of concrete; the foundations having an inclined back wall slanting away from the building, which is so designed that the main columns have no horizontal thrust at the base, but the small intermediate columns have the thrust of the coal at their base; thus taking care of the pressure of the coal against the sides of the building.

The roof is covered with Ludovici tiles, the finish being what is known as non-glazed or semi-porous. Except for its expense, glazed tile would be satisfactory for this structure, because any sweating and dripping inside the building would do no harm. Unglazed and semi-porous tile is necessary in such buildings as a power-house or a machine-shop, so that there may be no dripping. The tile does not, as might be expected, freeze and crack in cold weather from the absorption of water. During a cold spell last winter, extending for almost two weeks, the shed became covered with ice and snow (mostly ice) to an average depth of 4 inches; but the tile has not apparently been injured. Light is obtained principally through skylights in the roof, made of glazed tile, of the same form and size as the ordinary tile, and laid on the roof in the same manner. Additional light, and ample ventilation, are obtained from the opening between the roof and the top of the wall.

It is to be noticed that the coal in the building is stored on the ground, and not in an elevated structure. Wherever possible, it would seem that the coal should thus be stored; and where this is impracticable, it is important for the inside of the store to be entirely lined with concrete, so that no part of the supporting steelwork is exposed to the corroding action of the coal.

Public attention has been called to the possible danger due to corrosion in tall steel-frame office buildings; but danger from this source is largely accentuated in a coal store, with its sulphur and other corrosive substances. For this reason, where a permanent and costly structure is to be built, as is usual in the case of large power houses, coal-bins lined with steel plates should not be used, as they are liable in time to become a menace to life and property. In the case of Lowell, all main columns, and as far as possible the intermediate columns, are entirely covered with concrete. The steelwork which is exposed cannot be reached by the coal, can readily be painted, and is made throughout of heavy material.

The coal-store pockets of the power-houses of both the Manhattan Railway Company and the Metropolitan Street Railway Company of New York are steel structures, and are constructed on the lines indicated in the small diagrams accompanying the cross-section of the Lowell plant, the steel framework being covered with concrete.

On account of the limited space on the property for the coal storage plant, it was necessary to keep the building narrow; and consequently coal had to be piled to the considerable depth of 40 feet. It was therefore thought best to design the pocket so that it could be promptly emptied in case of fire from spontaneous combustion or other causes. With this in view, the floor was given a pitch 15° towards the tunnel in the centre of the building, so that the two sides can be easily and well drained of coal by the conveyor. In order, however, to expedite the removal of coal in case of fire, two panels in the sides out of every five were made of removable steel buckle-plates, with a movable column in the centre. These can be unbolted and moved promptly, and coal can be taken out of this opening, which is 10 feet wide.

In connection with this matter of spontaneous combustion, the use of upright wrought-iron pipes, placed at frequent intervals along the middle of the coal-pocket, are to be noted. These were installed by the Superintendent, Mr. T. H. Hintze, with a view to determining approximately, the temperature of the coal by means of a thermometer held at the upper end of the pipe. In this manner, any coal in the storage which shows signs of becoming heated can be conveyed to the retort-house and used.

Reverting to the machinery, the conveyor is of the gravity-bucket type, in which the buckets are 18 inches wide by 24 inches long, pivoted in the chain in such a manner that, while they maintain themselves normally in an upright position, they can turn through a complete revolution. The chain is composed of double flat links of steel, and the conveyor moves about 40 feet per minute. The driving mechanism is located in the truss, and is operated by two steam-engines of non-freezing type. This mechanism is peculiar from the fact that, instead of sprocket-wheels, the chain is driven by pawls; thus reducing the wear, and imparting smooth and uniform motion. The machinery receives the coal from the hopper under the railroad track, cracks the lumps to a uniform size, and carries them without transfer to any part of the building. When the new retort-house is completed, coal will be taken from any part of the storage and will be delivered to a separate conveyor leading to each retort-house. It is to be observed that all the functions of receiving, cracking, and rehandling are peformed by the conveyor; the receiving section of which can be detached when rehandling coal from storage. The coal is drawn into the conveyor by means of adjustable cast-iron valves, which have no sliding surfaces. When the valves are closed, the column of coal above does not tend to open them. Before the valve is open, the filler, which runs up and down the length of the tunnel, is placed in position under each valve. The coal then passes through the filler to the conveyor.

WASTE COKE-OVEN GAS FOR ENGINES.

At the last Meeting of the Institution of Mining Engineers, M. Reumaux, Managing-Director of the Société des Mines des Lens, read a paper on the "Use of Waste Gases from Bye-Products Coke-Ovens in Explosion Motors." After recognizing the labours of MM. Carvès, Otto, and Solvay in connection with the extraction of some of the useful products contained in the gases produced by the distillation of coal in coke-ovens, he pointed out that the utilization of the waste gases was only possible for coals containing above 20 per cent. of volatile matter. When it exceeded 22 or 23 per cent., it deserved the earnest attention of the manufacturer. The volume of gas in excess of that which was required to heat the oven was a function of the nature of the coal treated, its state of dryness, of the temperature of the air and of the gas at the burner, of the number and proper distribution of the burners, of the dimensions of the coke-ovens, of the thickness of the walls separating the flues of the ovens, of the duration of burning, &c. In Wesphalia, it was estimated that the volume of the excess gases might reach 25 per cent. of the total. This proportion seemed high; and the writer doubted whether it was the result of systematic measurements. Numerous data collected at the Lens collieries showed that, as a maximum, 12 per cent. of the excess gases were produced under the following conditions: Coal coked, 7 tons, containing 23 per cent. of volatile matter; moisture, 10 per cent.; ash, 9 per cent. There were three burners and seven air-inlets per oven. The temperature of the air was 608° Fahr., and that of the gas 122° Fahr. The period of burning was 36 hours. The thickness of the flue walls was 5 inches. The production of purified gas of 0·482 sp. gr. was 11,478 cubic feet per ton of coal coked.

The excess gas (originally employed to heat the steam-boilers, the boilers for distilling tar, stoves, &c.) had been for the past two years partly utilized in a double-acting gas-engine made on the Letombe system, of 20 to 25 horse power, working a dynamo. At the outset, this application presented rather serious difficulties, on account of the valves becoming choked by tar; but it had been completely successful since the gas had been purified before use. A coke-box, a kind of scrubber, and an oxide of iron purifier removed the tar and the sulphur. This purification, at present indispensable, necessarily caused a certain amount of complication. The recovery apparatus is being extended by additions, for the recovery of cyanogen and sulphur. By this means, the gas will return to the oven or will enter the cylinder of the gas-engine after the successive and profitable recovery of the tar, naphthalene, cyanogen, ammonia, benzol, and sulphur, of which latter the absorbents used will be charged up to 50 per cent. on account of the previous extraction of cyanogen. The specific gravity of the purified gases of the Lens coke-ovens is ·614. Its calorific power at 59° Fahr. is 475 British thermal units per cubic foot.

The quantity of gas produced by 120 coke-ovens, taking 7-ton loads and burning for 36 hours, under favourable conditions, is 35,000 cubic feet per hour; and this with a consumption of 29 cubic

feet per indicated horse power—figures given by experiment—represents 1200 indicated horse power, or (say) 10 horse power for each coke-oven at work. On the other hand, the waste gases of bye-products ovens vaporize a mean quantity of 0·75 lb. of water per pound of coal coked; or, allowing 33 lbs. of steam per indicated horse power per hour, about 9½ horse power per oven. It is remarkable that the production of steam from an ordinary coke-oven, on the basis of 1·4 lbs. of steam per pound of coal coked (the mean obtained in practice), develops exactly the same power. Thus the employment of explosion-motors for the utilization of coke-oven gases renders available the whole of the power that can be obtained from the waste gases of an ordinary coke-oven. The experimental data show a consumption per indicated horse power of about 29 cubic feet of gases, developing 475 thermal units per cubic foot. The electric efficiency was 0·746—a remarkable result, considering that it had been obtained by a motor of an old type, and rather worn. This must be considered not as characteristic of a motor of recent and improved type, but as an indication of the advantage that can be obtained from the waste gases of bye-products coke-ovens, when they are burnt directly in the cylinder of a motor.

After the paper was written, M. Reumaux stated that he had modified the distribution of the gases in the flues of the coke-ovens and the temperature of the coking, with the result that the volume of waste gases was much increased. He estimated that this disposable volume was now 18 instead of 12 per cent.; so that each coke oven would yield about 15 horse power.

A SUBMARINE WATER MAIN.

The "Revue du Génie Militaire" recently gave an illustrated description of an interesting piece of submarine main-laying carried out by the Spanish engineering service at Cuba.

It having been determined to increase the garrison in the forts of Cabaña and Morro to 3500 men, it was necessary to lay a main for the purpose along the bed of the sea, in the channel of Havana. Reckoning the daily consumption of water per head at 11 gallons, the quantity needed was 38,500 gallons. There is a pressure main at Havana; but, to carry the water as far as the forts on the opposite shore of the channel, it was necessary either to go round the roadstead, which would have involved the laying of an underground main 8 miles long, or run the main in a straight line, reducing the length to about 360 yards, but requiring it to be laid under water in the channel. It was decided to adopt this plan; and the work was executed with great celerity and complete success. It was found by calculation that a pipe 39 mm. (1½ inches) in diameter would be suitable for the purpose, and 16-feet lengths were selected. These were treated like a submarine cable—*i.e.*, strands of iron were wound round them spirally—so as to protect them from the wear resulting from friction on the rocks in the bed of the channel; and the joints were cased. The pipe having been joined up, it was covered with a thick coat of tar and fine sand, and the pressure test applied. In order to lower it into position, it was suspended under a number of small boats, so as to form a kind of long jointed vessel with a single keel. The pipe was gradually lowered into position, by means of ropes, at high tide; the work occupying about 2½ hours, including the connections with the shore ends. The cost of the main was about 4000 pesos, of which 1300 pesos were for labour. In order to ascertain the amount of curve to which the pipe could be safely bent, a model of the profile of the channel was made in the yard of the works, and the pipe laid upon it. Not only did it stand the test, but it could have been subjected to a very much greater bend without detriment.

Peat Fuel for Steam-Engines.—In an article in "Nature" for April 18, 1901, attention was directed to the commercial uses made of peat in Sweden, where it is coming largely into use as a substitute for coal for steam-engines. In a recent number of the "Engineer" an account is given, with illustrations, of the peat fuel works at Stangfiorden, in Norway, where electricity generated by water power has been in use since 1898 for the manufacture of peat for fuel. The chief difficulty is the extraction of the water, which comprises about 85 per cent. of the whole bulk, and which must be removed before the remaining carbonaceous matter can be rendered available for fuel. At Stangfiorden, the wet peat is brought direct from the bog to the factory in boats of 100 tons capacity. The material is removed from these by electric agency, and submitted to a preliminary operation of drying and pressing. The briquettes thus formed are then transported on small iron trolleys with shelves to the interior of the drying chamber, whence they are taken on the same trolley to the retorts, where they are packed round spiral resistance coils and the electric heating agent set in operation. The peat yields—besides the fuel briquettes, which form 33 per cent. of the whole—tar, charcoal, creosote, sulphate of ammonia, and other bye-products. The electric power is derived from five 80-kilowatt dynamos coupled direct to five turbines of 128-horse power. It is stated that the fuel burns well, yields little soot or ash, and is readily disposed of in Bergen and other towns.

REGISTER OF PATENTS.

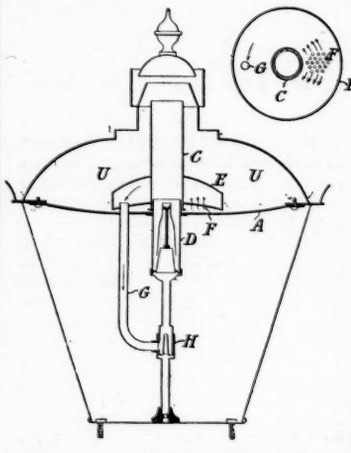
Heating Solid Materials with Gases.—Naef, P., of New York. No. 12,311; June 17, 1901. No. 14,976; July 23, 1901. Dates claimed under International Convention, Nov. 17, 1900, and May 10, 1901.

In the "JOURNAL" for Dec. 11, 1900 (p. 1447) an attempt was made to give some indication of the scope of a series of patents at that time passing through the English Patent Office in the name of the above inventor, Dr. Paul Naef. Subsequently, other patent applications have been filed; and many of the specifications relating thereto have been issued. It has been impossible, however, to summarize all of them within the available space in our columns; and readers of these lines who are particularly interested in the subjects dealt with, must consult for themselves the official publications. The extent of the labour involved in mastering the details of the last two even of the published specifications of the series may be gathered when it is stated that No. 12,311—"Improvements relating to the treatment of materials with gases, such as for gas making, smelting, or calcining, glass making or steel making"—is described in 17 pages of closely printed specification (including 68 separate claims), and illustrated by sheets of drawings containing 20 different figures. No. 14,976 has 17½ pages of print, 132 claims, and 12 figures; the matter dealt with in this case being "Improvements relating to the treatment of solid material with gas as in the carrying out of catalytical reactions."

Incandescent Gas-Lamps.—Thomas, J., of Hanley Road, N., and Podmore, A. E., of Herne Hill, S.E. No. 12,579; June 20, 1901.

The patentees propose to supply heated air to be mixed with the gas in their lamp before ignition.

As shown, the lamp is fitted with a horizontal reflector A in the upper part U, which is enclosed to form a warm-air reservoir. A metal chimney C conveys away the products of combustion to the outer air. The glass chimney D fits into the lower end of the metal chimney; and surrounding the base of the latter is a casing forming with the chimney an air-chamber E, which becomes highly heated when the lamp is in use, and air passing from the outer warming chamber U into it by the holes F, and through it, also becomes hot. From the chamber E, a pipe G descends through a hole in the reflector to a small chamber H below the burner, which chamber encloses the place where apertures are usually made in incandescent burners for the admission of air to be mixed with the gas before ignition.



When the burner is lighted, the current of air caused by the flame and the glass chimney D draws air down the pipe G from the chamber E to the burner, which air has been already warmed in the upper part of the lantern. The air entering the chamber E by the holes F, "becomes highly heated on passing through the chamber, and when it reaches the flame increases the illuminating power thereof."

Internal Combustion Motors.—Crossley, W. J., of Manchester, and Atkinson, J., of Marple. No. 13,926; July 9, 1901.

The inventors aim at the construction and operation of an internal combustion motor on the two-stroke-cycle system, "so as to obtain more power, and more regular turning, than with engines constructed on the Otto or four-stroke cycle."

Fig. 1 (p. 155) is a plan of the engine partly in section. Fig. 2 is a sectional elevation through the cylinder. Fig. 3 is an elevation of the pumps (partly in section) through the connecting-pipes and valves.

The motor consists of a single-acting working cylinder A, having its open end towards the crank-shaft, and its closed end outwards from the crank-shaft. The cylinder is fitted with a long open-ended piston B, and a rod connects it to the crank-shaft in the usual manner. The piston, when at the end of its stroke towards the crank-shaft, uncovers the admission-ports C to the cylinder; these ports being openings through the walls of the cylinder into the admission-passage D. At the outer end, the exhaust-valve is fitted. In addition to the working cylinder, there are two single-acting pumps, F being the one used for pumping gas and air in a special manner to be hereafter explained, and the air-pump G. The pumps have considerable clearance volumes—especially the gas-pump F; and the clearance volume of this pump mainly consists of an enlarged passage or pipe H. The gas-pump is fitted with a suction-valve I for gas situated near the pump, and a suction-valve J for air near the admission-valve K, which acts as a delivery-valve and is also used as a governor-valve. The air-pump is fitted with a suction-valve L, but does not require a delivery-valve, as the piston B in the working cylinder will open the admission-ports E at the time for delivery, and is made long enough not to uncover the ports C when at the ends of its strokes furthest from the crank-shaft.

The combined capacity of the pumps should (the patentees remark)

be greater than the capacity of the working cylinder, if the working cylinder is intended to expand the ignited charge to the same volume as before compression; but, as in large engines especially the expansion should be carried to a greater volume than the original charge, the pumps may be somewhat reduced in size.

The pumps may be driven from one crank-pin in the crank-shaft, as shown; the pump G being the annular space left between the areas of the smaller and larger pistons. They are timed together, so that the bulk of their deliveries takes place when the working piston has uncovered the admission-ports C to the cylinder.

Excepting for ignition arrangements, no other valves than those mentioned are necessary; and only two—the exhaust-valve E and the governor-valve K—require operating.

The working of the engine is as follows: Assume that the piston B is just completing a working stroke, the exhaust-valve E is opened so that any excess of pressure is allowed to escape from the cylinder, and the piston is commencing to open the admission-ports E. The pumps F and G having performed a small portion of their stroke, commence to deliver air into the cylinder as soon as the pressure falls. This delivery of air from the pumps is unchecked so far as relates to the air-pump G, but is only allowed to take place from the gas-pump F when the governor delivery-valve K is opened; and even after it is opened, air only is at first delivered from the gas-pump F, owing to the arrangement of the air receiver-passage H and the two suction-valves I and J. These air deliveries force out the burnt gases, and interpose a body of fresh air between them and the new charge. Gas admission afterwards follows; being mixed with air from the air-pump G.

Fig.1.

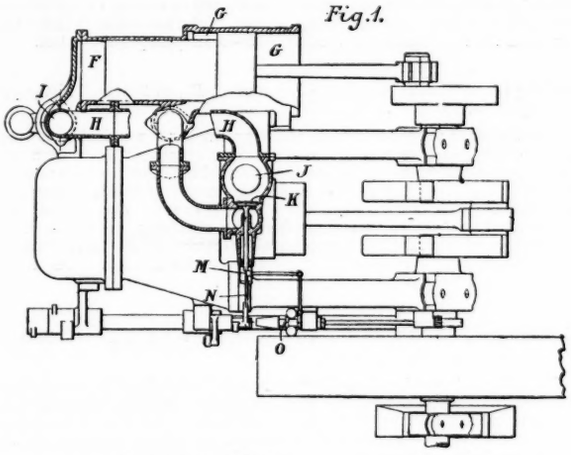


Fig.2.

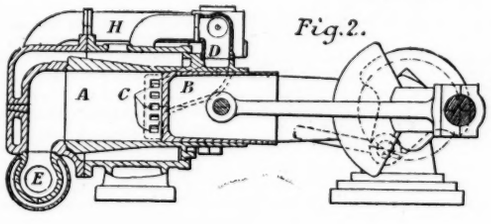
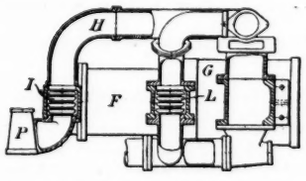


Fig.3.



As the pumps continue delivering, the burnt gases are driven out through the exhaust-valve E, and the working cylinder is chiefly filled with air near the exhaust-valve end, and a mixture of air and gas near the admission-ports C. The governor-valve K is caused to close before the delivery stroke of the pumps is completed; so that just at the last air only is delivered—thus leaving air only in the passages near the admission-ports C, and no gas to be blown through to waste at the next delivery.

As the piston returns, it passes the admission-ports C, and cuts off connection to the pumps. But if it is desired to work the engine with expansion to greater volume than the shut-in charge, the exhaust-valve E is kept open during the earlier part of this return stroke, letting out some of the air, or possibly some of the ignited products from the previous working stroke, until at any desired time it is closed, and the rest of the contents of the cylinder shut in, compressed during the rest of the stroke, ignited when at the end of the compression stroke, and thus giving a working pressure for the working stroke which may take place once for each revolution.

The engine may be governed by means of any suitable connection from a governor to the governor-valve K. If working strokes are not required at all, then this valve is not opened, and no gas enters the working cylinder A; the contents of the gas-pump F being compressed in its clearance space and re-expanded. If a reduced working stroke is desired, the governor-valve is opened and closed for a shorter time, so that a reduced charge of gas is admitted. The reduced length of time during which the valve K is open may be conveniently arranged by having steps on the die M of varying depths—this die being interposed between the knife-edged pusher N and the head of the valve K, and moved sidewise by the governor O. Otherwise a stepped cam moved by the governor may be used in the well-known manner. In some instances, also, the timing of the closing of the exhaust-valve E may be under control of the governor, or by hand, so as to vary the amount of charge shut in for compression.

Gas-Engines.—Melhuish, A. G., of Edmonton. No. 14,879; July 22, 1901.

This invention has for its object to construct a gas-engine so that an impulse on every revolution of the crank is obtained without the aid of cams, valves, levers, or other extraneous aid; also to ensure that the combustible mixture is expanded after firing to greater than its original volume.

The proposal is to arrange that the piston itself and variously properly placed ports in the cylinder so control the outlet and inlet of the gases as to produce the required functions of suction, compression, expansion, and exhaust. For this purpose, the cylinder is closed at one end, and has a conical combustion chamber, the apex of which is near one side of the cylinder; and on this side, at the piston's extreme outstroke, the inlet-port is formed. A deflector on the piston-head is placed opposite this port (in close proximity to it) for deflecting the inrushing combustible mixture to the apex of the combustion chamber, where it gathers and displaces the products of the previous combustion lower down the cylinder. At a distance corresponding to about two-thirds of the piston's out-stroke is an exhaust-port that, opening outwards at this point, is returned by a passage to the cylinder a little lower down, at which point the piston is made with a reduced neck between its front and back end, so as to form an annular chamber, into which the exhaust gases escape from above the piston, and thence by another port to the atmosphere.

Assuming the piston to have been pushed outwards by an explosion of the charge, any pressure remaining will escape by the port and around the annular chamber formed by the contracted-portion of the piston, to the atmosphere. The further outward movement of the piston closes this lower port, so that, when the piston has completed its out stroke, a partial vacuum is formed. The new charge thereupon rushes in, and is deflected upwards in the manner before stated; and the return stroke of the piston compresses the contents of the cylinder up to the point of the exhaust-port, which (on again opening) permits a further portion of the products to escape. Beyond this point, the mixture is compressed and fired in the usual way.

Gas-Heated Water-Boilers.—Smith, C. W., of Fulham, S.W. No. 21,252; Oct. 23, 1901.

This invention relates to a valve-operated device to be fixed in connection with geysers and other gas-heated water-boilers, so as to automatically regulate the supply of gas to the burners by means of floats operated by the level of the water in the supply tank, in order that the heat from the burners may be reduced or cease, as the water supply is reduced or ceases, and *vice-versa*. In this way, explosions and the unnecessary burning away of the boiler when empty would be avoided.

Gas-Engines.—Körting, E, of Hanover. No. 17,091; Aug. 26, 1901.

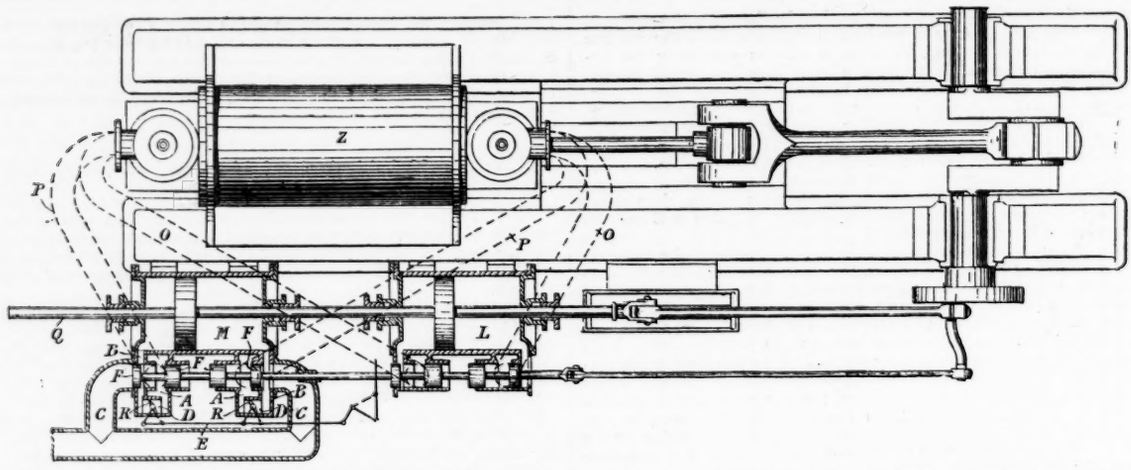
This invention relates to two-cycle motors in which the charge is supplied by separate air and gas pumps; the object being to regulate the power by the amount of fuel supplied. One means of doing this consists in providing, in the gas-pump between the compression chamber and the end of the pump cylinder, a bye-pass, the size of which can be altered by means of a closing device controlled by the governor. When the pump is in action, a portion of the gas already supplied is pumped out again; the quantity thus pumped back varying according as the bye-pass is opened to a greater or less extent. The quantity of gas drawn in afresh and supplied during the next compression stroke is varied accordingly; and the charge is thus rendered richer or poorer.

The illustration (p. 156) shows the arrangement of pumps and gear for distributing air and gas for a double-acting two-cycle motor.

The motor cylinder Z, with piston-rod, connecting-rod, and crank, are of any usual form. An air-pump L and gas-pump M are provided at the side of the cylinder; the pistons of both the pumps being mounted on the same rod Q. The air-pump has an ordinary valve gear, and the air is supplied to inlet-valves at each end of the motor cylinder through pipes O. A gas-pump is also provided with a valve gear in the form of piston-valves F, and the gas is supplied to the inlet-valves of the motor cylinder through pipes P, so that the air and the gas meet in the inlet-valve chamber or mixing chamber and form the explosive mixture.

In constructing the gas-pump, each compression chamber A is placed in communication with the corresponding end of the pump cylinder M, by means of a passage D containing a valve R, the position of which, and consequently the degree to which the passage is opened, is regulated by a system of levers E controlled by the governor. The pump is provided with a suction chamber C, through which the gas enters.

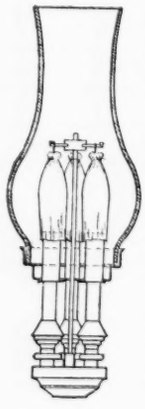
When the motor is working, the air-pump continually supplies through the pipes O the full quantity of air—*i.e.*, the volume displaced by the piston, and always draws in from the outside a similar quantity of fresh air. But this is not the case with the gas-pump. When the gas-pump is discharging with the bye-pass D open to a greater or less extent, more or less gas is sucked back again from the compression chamber A or discharge-pipe P, which is in communication with the air-pipe O through the inlet-valve chamber; so that in this case air is drawn from the air-pipe O into the gas-pipe P. During the next compression stroke, the gas-pump delivers either the whole or part of the volume displaced by the piston, according to the construction of the gear of the inlet-valve. But before this gas can reach the inlet-valve chamber through the gas-pipe P, it must replace the amount of gas or air previously pumped back—that is to say, it must force back the air which entered the gas-pipe P—with the result that in reality the amount of



gas supplied to the driving cylinder Z through the inlet-valve will be less by the quantity pumped back during the suction stroke, and consequently the motor will develop correspondingly less power.

As the pistons of both the air and gas pumps always move through the same stroke, the relation of the quantity of air to that of the gas passing through the pump cylinders in the same time always remains constant and equal to the relation between the pistons. As soon as during the compression stroke of the gas-pump the gas reaches the inlet-valve and begins to mix with the air entering at the same time, the proportion of gas and air is that most suited for explosion. "The quality of the explosive mixture as it enters, therefore, remains always the same, only the quantity changes." On the contrary, the quantity of air supply from the air-pipe O remains constant; and during the compression stroke of the pump, fresh air enters the motor cylinder until the gas reaches the inlet-valve, and from this moment the entering charge consists of explosive mixture.

Incandescent Gas-Lamps.—Schaeffer, W., of Hamburg. No. 1774; Jan. 22, 1902.

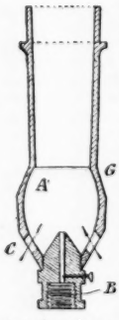


This invention, relating to incandescent gas-lamps, has for its object the production of "increased luminosity without its being necessary to resort to a forced gas pressure and the accompanying long special feed-pipes for the creation of the increased draught."

The method proposed (as shown) is characterized by the fact that the chimney employed encloses a certain number of bunsen burners (each adjustable separately, and carrying an incandescent mantle); atmospheric air entering through an outer series of openings in the gallery supporting the chimney and passing over the outer surfaces of the mantles, while a central opening conducts air within the burner-crown, which passes over the adjacent inner faces of the mantles. The chimney enclosing the burners is formed in such a manner as to run almost parallel with the conically narrowing tops of the mantles, "in order to oblige the heat which is passing off to exercise a greater effect upon the thickened portion of the mantles which is constituted by the folds or gathers."

Incandescent Gas-Burners.—Dessy, A., of Genval, Belgium. No. 8505; April 11, 1902.

The patentee proposes "to secure the production of a perfect mixture of gas and air by giving a maximum speed to the mixture, and by maintaining a high temperature in the atmosphere surrounding the mantle," by the use of—(1) A mixing-chamber of ovoid shape, (2) a conical-ended nozzle through which the gas enters the mixing-chamber.



As shown, the burner consists of a mixing-chamber A, into which the gas is introduced through a conical-ended nozzle B. The air is drawn in through apertures C, and meets with resistance by striking against the upper wall of the chamber—thus becoming intimately mixed with the gas before passing into the tube G. The mixture of gas and air passes to the mantle through this tube, "which preferably has the form of an inverted slightly truncated cone, the end of which has a flange with a wire netting cover in order to prevent explosion of the mixture." The mantle is surrounded by a glass chimney, the base of which is preferably perforated "so as to produce a draught which helps to increase the illuminating power of the mantle."

Gas-Lighters.—Heys, W. E.; a communication from L. M'G. Thompson, of New York. No. 3206; Feb. 8, 1902.

This invention relates to gas-igniters which combine in one an electric lighter and an automatic lighter of that class in which a chemical pill becomes heated when subjected to a flow of gas. The object of the invention is to utilize the functions of the chemical lighter to aid a battery in bringing a conductor to incandescence for igniting the gas, thereby rendering it possible to use a small battery or a larger one nearly exhausted. The chemical (platinum black) is used in small quantity, and is distributed throughout a porous body, such as asbestos, which preserves it, and renders it unnecessary to renew, except after a long period of use. An important feature of the invention is the material used for the incandescing conductor—a strip of platinum foil.

Making Incandescent Mantles.—Nordmann, R., of Berlin. No. 9339; April 22, 1902.

The patentee proposes a method for producing "a uniform, strong, and smooth head or top on incandescent mantles," in which the upper end of the fabric (whether single or folded together with another material) is gathered or pleated so as to reduce it to the width required for the outlet aperture—this width being exactly determined and maintained at will and thereupon fixed by stitching. If desired, the upper part of the fabric is subsequently turned over for strengthening purposes, so as to form a tuck, or provided with a framing or reinforcement or solid body of any suitable material.

Gas-Burners.—Schonfelder, H., and Stepan, W., of Brieg, Germany. No. 10,757; May 10, 1902.

This is an invention that is "patented" some half-dozen times a year on an average, and one that it would not be possible to pass through more than the preliminary stages in (say) America or Germany. In England, however, the authorities are permitted to accept the application, failing outside opposition within the statutory time.

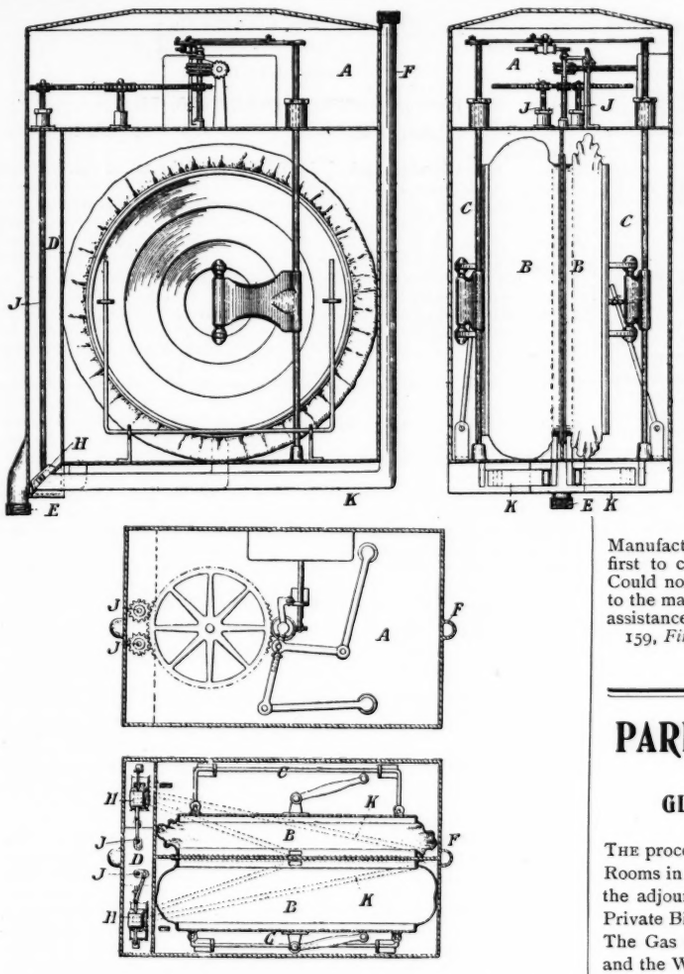
The claim made is for "a gas-burner characterized by the insertion, in advance of the nozzle perforations, of a piece of filter or like gauze for the purpose of regulating the current of gas and allowing only such a quantity to pass through as is required to feed the flame." The patentees state that the gas accumulates at the back of the wire-gauze insertion, and passes through it only in such quantity as may be required to feed the flame. In this manner, "perfect combustion is secured; while any excess of gas, over and above that required for the flame, cannot pass through the burner and pollute the atmosphere of the room, which, as a consequence, remains in a comparatively pure and healthy condition." It has been proved by experiments, they say, that when the burners are used there is a saving of from 30 to 40 per cent. of gas, "without any diminution in the brightness of the light."

Gas-Meters.—Ellsworth, E. R., of Brooklyn, U.S.A. No. 10,090; May 1, 1902.

The patentee claims the construction of a gas meter having its gas inlets and outlets so disposed, respectively, in their relations to the controlling valve or valves that the liquids of condensation will flow from and through the meter and its valve or valves, in a direction opposite that in which the gas flows, at all times, without sealing the ports or passages.

As shown (p. 157), there is a horizontal partition to separate the upper chamber A, containing the gearing, and a vertical partition dividing the main chamber below into an inner and an outer diaphragm chamber B C. The inner chambers are enclosed by the usual flexible fabric secured to a diaphragm and to a flange on the separating partition. The respective diaphragms are coupled at their centres by arms to upright rock-shafts, which extend up through packed bearings into the gearing chamber A, where they are coupled by arms and links to a crank on a crank-shaft. On this shaft is a worm, in gear with a pinion on the shaft, which drives the gearing of the counter or meter proper. All this is well-known mechanism in meters, and requires no further description.

In the ordinary meter, the valves which control the flow of gas through the meter are simple slide-valves situated in a chamber within the chamber A; and the gas must flow up to this chamber and back again, as the valves are situated above the diaphragm chambers. But in the present construction, E is the inlet from the street-main and F the outlet to the house service-pipe. D is a gas and valve chamber formed at the side of the diaphragm chambers, and extending down below the bottom of the chambers. At the bottom of the chamber are two inclined valve-seats, each having in it, as usual, two inlet-ports and an exhaust-port between them. On these valve-seats are set slide-valves H, each coupled by a link to a crank in an upright rotatable shaft J, which extends up through the gas-chamber D, and through packed bearings into the chamber A above, where it carries a pinion in gear with an intermediate wheel in gear at the opposite side with a pinion on the crank-shaft. Thus rotation of the last-named shaft by the



diaphragms imparts the proper reciprocating movement to the valves; H; and the latter control the flow of gas to, and its exhaust from, the diaphragm chambers of the meter. The valve-seats are inclined so that any liquid reaching the ports therein from the outlet of the meter will flow back into the bottom of the valve and gas-chamber D, and thence to the gas-inlet E, which descends from the gas-chamber D, so as to carry away any liquid therefrom and thus form a drainage conduit leading to the street-main.

From the intermediate exhaust-port of each valve-seat, a conduit K leads to the gas-outlet F; and from the respective inlet or outer ports in the valve-seat, conduits lead to the respective inner and outer diaphragm chambers B and C. These conduits are situated below the level of the diaphragm chambers. Valve controlled ports are also situated below the level; so that while the gas may flow from the inlet E, through the chambers of the meter and the conduits to the outlet F, the liquid condensed in the house-pipes will flow from the outlet back through the same conduits to the ports in the valve-seats, thence to the gas-chamber D, thence to the inlet E, and thence to the street.

The ports in the valve-seat have their lower margins below the level of the axes of the conduits they control, and above the level of the lower margin of the aperture through which the gas enters the gas-chamber. This construction effectually prevents the sealing and clogging up of the ports and passages in the meter with liquid, and also provides for the carrying away of the liquid to a point where it may be conveniently removed without disturbing the meter.

APPLICATIONS FOR LETTERS PATENT.

14,516.—Foster, J., "Manufacture of sulphate of ammonia from gas liquor." June 30.

14,646.—Cooney, H., and The Liverpool and London Meter Company, Ltd., "Automatic meters." July 1.

14,657.—Nehmer, H., "Statical machines for lighting gas." July 1.

14,688.—Thompson, W. P., "Photometers." A communication from L. B. Marks. July 1.

14,703.—Potter, W. G., "Fluid pressure motors." July 1.

14,733.—Pease, E. L., and the Cargo Fleet Iron Company, Ltd., "Cooling for subsequent purification of the combustible hot gases exhausted from furnaces." July 2.

14,771.—Thwaite, B. H., "Cleaning blast-furnace gases." July 2.

14,805.—Bachner, A., "Gas-burners." July 2.

14,859.—Southey, A. W., "Measuring liquids." July 3.

14,870.—Husband, J., "Gas-lamps." July 3.

14,873.—Gindra, C., "Gas heating-stoves." July 3.

14,833.—Fielding, J., "Gas-producers." July 4.

14,916.—Zimmer, G. F., "Door for retorts." A communication from B. Köhnlein. July 4.

14,954.—Haas, E., "Gas-meters." July 4.

14,989.—Rauke, H. J., "Gas heating-devices for baths." July 5.

15,002.—Coley, G., "Incandescent mantle holder." July 5.

15,028.—Weyland, J. A., "Internal combustion engines." July 5.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

Sons of the Gas Industry.

Sir,—I have been much interested in the movement on foot to organize a Junior Gas Engineers' Association for London and District on somewhat similar lines to that existing in Manchester, and am astonished at the lack of interest and energy shown by the "juniors" of London in the formation of such an Association for their technical and general improvement.

I was glad to observe in your issue of July 1, a spirited letter from Mr. Campbell offering to take the initiative, and inviting letters containing expressions of opinion to be sent him, with a view to promoting such an Association. Since then I have seen Mr. Campbell on the subject, but regret to say that the paucity of replies is most discouraging, and does not point to an early inception of this helpful body.

Can nothing be done to rouse the "juniors" of London and district from their lethargy, and apparent contentment with their existing conditions? Are they willing to sleep on while their brothers in the North are pushing forward? I should have thought the majority of students of "Gas Manufacture" at the various Polytechnics in London would be the first to come forward; but I understand that not one has replied. Could not the gentlemen who hold the classes, and who are known to the majority of the students, come forward and render their valuable assistance?

R. H. Brown.

159, *Finboro' Road, Earl's Court, S.W.*,
July 10, 1902.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

The process of clearing up has been going on quietly in the Committee Rooms in the past week; and there is every prospect that well before the adjournment, which is expected to take place on Aug. 8, every Private Bill introduced this session will have been finally dealt with. The Gas Orders Confirmation Bill (No. 1), the Consett Water Bill, and the Weardale and Shildon Water Bill, have been before the Unopposed Bills Committee; and the preamble of the Devonport Corporation Water Purchase Bill has been passed by the Committee of which Sir James Woodhouse is the Chairman. By the way, it may be mentioned that that old friend of the gas industry, Colonel Sadler, is a member of this Committee. This, we believe, is the first time since his election to Parliament that he has served in this capacity; and it is to be hoped that it will not be the last. He would be an especially useful member on a Committee dealing with Gas Bills.

The S. M. Crusade against Rate-Aided Electric Lighting.

Gas Companies will be encouraged by what has transpired in the past week in connection with the subject which formed the chief topic of these notes in our last issue. It is a confirmation of the precedent set at the instance of the South Metropolitan Gas Company, in the case of the Bermondsey Electric Lighting Order, for the insertion of a clause protecting the ratepayers generally against having to contribute to the support of the electric light venture of the local authority, and insisting that it shall be self-supporting. The confirmation is found in the Woolwich Electric Lighting Order. This is an Order which had successfully pursued its course until it got to the stage in which it was bound up in a Confirmation Bill with other similar measures; and then, by a stroke of the Earl of Erne's pen, it was rooted out of the Bill. It happened in this wise: The South Metropolitan Gas Gompany had, when the Confirmation Bill was before his Lordship's Committee, been opposing the Bermondsey Electric Lighting Order for the sole purpose—as the largest ratepayers in the district affected, and ratepayers who will not reap any beneficial advantage (but rather otherwise in view of competition) from the Corporation undertaking electricity supply—of being absolved from contributing to the maintenance of the concern in the very likely event, under the circumstances, of its being unprofitable. The Committee, seeing the justice of the arguments adduced by Mr. Balfour Browne, K.C., on behalf of the Company, satisfied them by inserting a clause ordering the undertakers to cause to be prepared every year a statement of accounts of the Electrical Department, and thereupon to fix the charges for current in the then ensuing year at such rates (not exceeding the maximum specified) "that, as far as is reasonably practicable, the revenue for that year shall not be less than the expenditure." This, as pointed out last week, is eminently fair. After the disposal of the Bermondsey Order, the one from Woolwich was introduced; and as the Company were again opposing with the object of obtaining similar protection, Mr. Balfour Browne, in view of the non-appearance of the promoters, asked that the Order should be struck out of the Bill. Their Lordships complied. There was no necessity perhaps for quite such a drastic step as this; but for the time it certainly looked as though the little hopeful of the Woolwich Local Authority was irrevocably destroyed by their own neglect. However, on being reported, the House resuscitated the Order, and instructed that it should be referred back to the Committee, for the insertion of a "deficiency-preventing" clause in terms precisely the

same as that incorporated in the Bermondsey Order. This was done last Tuesday. With gas at 2s. 3d. per 1000 cubic feet, the Company will not fear the competition of the electric light in Woolwich. And it is really a good thing for gas companies generally that the House of Lords took the view they did; for it confirms, in a forcible manner, the decisive victory against rate-aided electric lighting which the South Metropolitan Company gained the preceding week. The Company, their consumers, and the ratepayers who are not electricity users have good reason to rejoice. They may have to suffer a little by the public electric lighting being charged for up to the maximum; but they will have the consolation of knowing that now they will not be called upon to contribute something to the cost incurred in lighting other people's establishments. Moreover, the importance of these successes as precedents for other gas companies cannot be defined in words. Sir George Livesey and his Company have indeed once more given the steering-wheel of the gas industry a favourable turn.

Devonport Water Purchase. It will be remembered that there were two Bills introduced this session dealing with the water supply of Devonport. One, promoted by the Corporation, sought authority to compulsorily purchase the Water Company's undertaking, and the other introduced by the Company had in view the improvement in quantity and protection of the water supply by the construction of additional works. In the Lords, the Committee who considered the Bills gave preference to the proposal of the Corporation to purchase the concern; and therefore the Bill was passed forward and the Company's measure was rejected. The Purchase Bill came last Thursday and Friday before Sir James Woodhouse's Committee. The Water Company, still unwilling to sell, opposed it—having for Counsel Mr. Balfour Browne, K.C., Mr. Freeman, K.C., and Mr. Talbot; and these learned gentlemen fought hard to destroy the case of the promoters, who were represented by the Hon. J. Fitzgerald, K.C., Mr. Honoratus Lloyd, and Mr. Bodilly. However, the evidence and argument were in every respect similar to that laid before the Lords. The quality of the water could not be contested in view of a favourable report of the Medical Officer of Health; but the fact that the Company had proposed very extensive works for immediate construction was put forward as showing that the undertaking required the expenditure of a large sum upon it to make it thoroughly efficient. It was suggested by the Town Clerk (Mr. A. B. Pilling) that it might be possible, if the undertaking were in the hands of the Corporation, to form a Joint Board to control both the Plymouth and Devonport water supplies. But no understanding of any kind in this direction has been arrived at between the parties; and the suggestion seems therefore to be nothing more than a pious hope that something of the kind may eventuate. Mr. Balfour Browne, however, is confident that Plymouth will not enter into such an arrangement unless Devonport is incorporated with Plymouth. Mr. James Diggle and Mr. G. H. Hill were the Engineers called on behalf of the promoters; and it is their opinion—naturally—that the best interests of Devonport will be served by the works being transferred. It was contended by Mr. Balfour Browne that no case had been made out for the Bill; and he entirely relied upon the cross-examination of the promoters' witnesses and his argument as proof of this. The officers of the Company also petitioned against the Bill, in order to secure provision for compensation. But the Town Clerk pointed out that there is a clause providing for the compensation of the Engineer and Manager; and, as to the other officers, the Corporation will require their services. The hearing of the case occupied the sittings on Thursday afternoon and Friday, and ended in the preamble of the Bill being declared proved. With respect to the borrowing powers, the Chairman made it clear that the costs of the Bill (which look as though they will be rather heavy) must be paid within five years; and as to the suspension of the sinking fund, that is only to apply to the original loans, and not to any future loans sanctioned by the Local Government Board. The consideration of clauses was allowed to stand over until yesterday, in order that the necessary amendments might be effected.

Dispensing with Standing Orders. The promoters of the Ystradfellte Water Bill (the Neath Rural District Council), almost at the eleventh hour, petitioned to be allowed to insert an additional clause to empower them to buy the water undertaking of Messrs. Wright, Butler, and Co., Limited, for £1500. The Examiner had no other alternative than to report non-compliance with the Standing Orders so far as the petition went, inasmuch as the proper notice had not been given. The Bill came on Tuesday before the Standing Orders Committee of the House of Commons; and, after due consideration, they decided to dispense with the Standing Orders, and permit the new clause to proceed. This is a case in which no harm will be done to anybody, as there appears to be nothing contentious about the proposal to acquire these small works. A petition to introduce material matter of this kind during the progress of a Bill is always very narrowly scrutinized, and is not a thing which is regarded with favour by the authorities. They are very jealous of the rights of other people, and will not countenance the late introduction of powers which, under ordinary circumstances, might be challenged, and subjected to discussion before the Committees. Here, however, it is manifest that though authorization to purchase the private works in question was not asked for until the Bill had far advanced, the additional project is considered a beneficial one for all concerned.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills reported: Chard Gas Bill, West Gloucestershire Water Bill, Gas and Water Orders Confirmation Bill (No. 1).

Bills read the third time and passed: Chard Gas Bill, Gas and Water Orders Confirmation Bills (Nos. 1 and 2), Huddersfield Corporation Bill.

HOUSE OF COMMONS.

Friday, July 11.

LONDON WATER (RECOMMITTED) BILL.

This Bill stood first on the orders for the day; but prior to its consideration,

Sir M. Bhownaggree asked the President of the Local Government Board, with reference to the part of the Bill dealing with the financial provisions (clause 15 of the Bill), whether sub-section 6—providing that the Water Board should not reduce the rates charged for the supply of water below those in force during the quarter ending June 24, 1902, if such reduction would, or would be likely to, cause a deficiency in the water fund—would prevent any equalization of water charges.

Mr. Long replied that he thought not. The Board would acquire all the rights and powers of the several Water Companies; and, with a view to the equalization of the water charges, they would be able to alter, within the limits prescribed by the Acts relating to any particular Company, the rates now charged by that Company for water, but must not reduce them below those in force during the quarter ending on June 24, 1902, if such reduction would, or would be likely to, cause a deficiency in the water fund. The reason for this limitation was that the amount of any deficiency in the water fund would have to be met out of the general rates levied on the area under the Water Board.

On the question of going into Committee on the Bill as recommitted,

Mr. S. Buxton proposed to move that, as the Joint Committee to whom the Bill was referred first rejected the proposal of the Bill in reference to the constitution of the authority to be created for the purchase and management of the water supply of the Metropolis, and were then evenly divided as to its constitution, it be an Instruction to the Committee that they have power to provide for the purchase of the undertakings by an existing authority, pending the further consideration, by a Select Committee or otherwise, of the authority to be created to manage the undertakings after they shall have been purchased.

The Speaker, however, ruled that such an Instruction on going into Committee on the Bill would not be in order.

The House then resolved itself into Committee on the Bill—the Right Hon. J. W. Lowther in the chair.

On clause 1, dealing with the establishment of the Water Board,

Captain Norton moved that progress be reported, on the ground that the evidence taken before the Joint Committee had only that morning been circulated among members, and that they had not had any opportunity of examining it.

Sir H. Campbell-Bannerman supported the motion.

Mr. Long contended that the course taken by the Government was the usual one. The proceedings of the Committee had been reported in the papers; and the question was whether honourable members really knew the main features of the case in regard to the Bill. The facts were notorious; they had afforded matter for discussion outside the House, and the County Council did not appear to find any difficulty in reviewing what had taken place before the Committee.

After some discussion, the motion was rejected, on a division, by 123 votes to 86.

Mr. Buxton then moved that clause 1 be postponed; contending that the arguments used in favour of reporting progress applied with still greater force to the motion he now made. The first clause was not only the pith of the Bill, but very nearly the whole of the evidence taken before the Committee was in reference to its subject-matter. He therefore contended that the House was not in a position to properly discuss the clause until they had seen what the evidence was upon which it was based.

Mr. Long said it was impossible for the Government to assent to the motion. The opinion of Mr. Perrin, the Official Water Examiner for the Metropolis—and no one possessed greater knowledge of the water area of London and its needs and requirements than he—was taken with regard to the numbers of the new Board and its duties; and it was that the Board could not do its work well unless it was big enough to provide at least seven or eight Committees. The Bill was a big measure, no doubt, and dealt with a large amount of property; but, after all, the one which brought into existence the Manchester Ship Canal involved more money. It had been said that the sole reason for this Bill being sent to a Committee was because it was an important one. That was absolutely incorrect. If it had not been for the private interests affected, it would never have gone to the Joint Committee. But the consideration of the Committee was not limited to private interests, though the Bill was sent to them in order that these interests might be defended by Counsel through the medium of the evidence of witnesses. There was no doubt that the whole Bill was before the Committee when once it was referred to them. If the House declined to proceed with a measure until the evidence taken upon it was before it, it would create an absolutely new precedent with regard to Private Bill procedure. He submitted that all that it was necessary to know in connection with this measure was in the possession of those interested in the London Water Question. He could not think it was right or just to postpone a measure of this kind until the evidence had been digested. Such a course would involve very great delay; and he must ask the Committee to proceed with the consideration of the clause.

Mr. Mellor expressed the belief that a comparison of the evidence given before the Joint Committee with that submitted to the last Royal Commission would show conclusively that the view taken by the Opposition as to the proper number of the governing body was the right one. This, he thought, was the real reason why the President of the Local Government Board would not consent to the postponement of the consideration of the clause.

Mr. Bartley objected to the postponement, because London had made up its mind to buy the Water Companies' undertakings; and he was anxious that they should complete the purchase. As a Director of a Water Company, however, he looked upon the proposed Board as most unmanageable, and as one which would lead to great expense and increase of rates. He was himself in favour of a small paid Board, and thought that under the Board as now constituted there would be a tendency for the management to be in the hands of permanent officials.

Sir W. HOULDSWORTH said he was precluded by the ruling of the Chair from defending in detail the action of the Joint Committee in changing their opinion, but he might say that it was based upon the evidence. He did not think the motion was one which ought to be entertained by the Committee, although he was bound to say he had been impressed a good deal by what had been said in favour of not proceeding with the clause until members had examined the evidence. As one of the Committee, he was anxious that they should do so.

Sir W. HARCOURT said the honourable member had delivered a most conclusive speech in favour of the postponement of the clause. What he said practically was that they could not form an opinion upon the change of opinion on the part of the Committee without hearing the evidence; and this was just what they said on that side of the House. The situation was unprecedented in the history of the House.

Mr. LONG pointed out that the Metropolis, the Water Companies, and the Local Authorities of London were all affected by this question. Out of 62 Members of Parliament for London, 55 supported the Government in their action, as did the great majority of the Local Authorities in London and the urban and rural districts around. There was nothing extraordinary or improper in the action of the Government in asking the House to proceed with the consideration of the clause.

Mr. MOULTON said the thing which had struck the whole nation was that the Joint Committee, by a large majority, had decided one way, and when they next met they were told that the Government disapproved of the decision. It was then decided that evidence should be taken; and on this it was reported that the Committee had reversed their decision. If there was one thing that would be disgraceful to the House it would be that Committees were supple to Government pressure; and if there was one thing that would be disgraceful to the Government, it would be that they exercised pressure on Committees representing the House. The one justification, both of the Joint Committee and the Government, was that the evidence called was such as rightly to leave them to say that the Committee were not supple, but were simply keeping their mind open, and that the Government were not exercising improper pressure. The attitude assumed was that the Committee were wise in boldly altering the position they had previously taken up by their vote.

Sir W. HOULDSWORTH remarked that the constitution of the Board was dealt with in a later portion of the Bill; and if they proceeded with the first part of the clause, honourable members would have an opportunity of reading the evidence before considering the constitution of the Board.

The House divided, and the motion was rejected by 163 to 101.

The consideration of the clause was then proceeded with. As it stood, it provided for the establishment of a Water Board, to consist of a Chairman, Vice-Chairman, and 71 members, the latter to be appointed by constituent authorities specified in the third schedule. The first amendment on the paper stood in the name of Mr. Burns, and had for its object making the London County Council the Water Authority. Mr. Rigg had given notice of a similar amendment. They were ruled out of order, on the ground that the principle of the Bill was to constitute a Water Board, whereas the amendments merely provided for the transfer of the water-works to an existing body. An amendment was then moved by Captain Norton to provide that instead of the Board being called the Metropolitan Water Board, it should be called the London and Counties Water Board. This was opposed by Mr. Long, who held that the title given in the Bill was adequate; and the amendment was negatived without a division.

Discussion next arose on the portion of the clause specifying that the Board should be established for the purpose of "acquiring by purchase and of managing and carrying on the undertakings" of the Water Companies mentioned in the first schedule.

Mr. LOUGH moved to omit the words "acquiring by purchase and of." He said he wished to raise the question of the competence of the body proposed to be constituted for the work of purchase, which would be a gigantic undertaking, and should be entrusted to persons who would be able to protect the vast interests concerned.

Mr. LONG said there could be no doubt as to the importance of the question raised by the amendment; but, notwithstanding that fact, he thought the Committee would not require much time to deal with it. He could not conceive it possible that any considerable number of members would be found to approve a proposal that a new body brought into existence for the purpose of solving the London Water Question should be only permitted to manage and control the Companies without the power of purchase. The position of the new Board would be an intolerable one, because the Companies would resent the placing of such a body over them. He could not conceive anything less likely to produce efficient management of the London water supply; and therefore he hoped the Committee would reject the amendment.

Mr. BUXTON supported the amendment, explaining that he did so, not because he was against the principle of purchase, but because he believed the nondescript body created by the Bill was absolutely incompetent to carry out purchase in a manner equitable to the ratepayers. The only body capable of dealing with the matter—the London County Council—was practically excluded.

Mr. CHAPLIN thought the honourable member was mistaken. The London County Council would be represented by ten members, and he believed this number exhausted all the available knowledge of the Council on the water question.

After some further remarks, the amendment was rejected, on a division, by a majority of 91.

Progress was then reported, and the House adjourned.

The following further progress has been made with Bills:—

Lords Bills read the first time and referred to the Examiners: Gas and Water Orders Confirmation Bills (Nos. 1 and 2).

Lords Bill read a second time and committed: Water Orders Confirmation Bill.

Lords Bills reported: Consett Water Bill, Gas Orders Confirmation Bill (No. 1), Weardale and Shildon District Water Bill.

Lords Bills read the third time and passed: Bristol Water Bill, Gas Orders Confirmation Bill (No. 1).

WOOLWICH ELECTRIC LIGHTING ORDER.

The Electric Lighting Provisional Orders (No. 8) Bill came last Tuesday before the Earl of Erne, the Chairman of the Committee to which the Bill had been originally referred, on recommendation from the House of Lords (see *ante*, p. 100). It may be remembered that after the Committee had disposed of the Bermondsey Order in the Bill, Mr. Balfour Browne, K.C., who appeared for the South Metropolitan Gas Company, the opponents, said he understood that there was no appearance for the promoters in the case of the Woolwich Electric Lighting Order; and the Bill was accordingly reported. It was, however, referred back to Lord Erne for the introduction of the clause which had been inserted at the instance of the Gas Company. The following clause (7A) was accordingly inserted in the Woolwich Order:

> The undertakers shall, once in every year after the first year's working of the undertaking, cause to be laid before them a statement and balance-sheet of the accounts of the undertaking, drawn up in accordance with the form of accounts prescribed by the Board of Trade for a local authority under the Electric Lighting Acts of 1882 and 1888; and the undertakers shall thereafter fix annually the charge to be made for the supply of energy in the then ensuing year at such rates (not exceeding the maximum rates specified in this Order) that, as far as is reasonably practicable, the revenue in that year shall not be less than the expenditure in that year.

The Bill was ordered to be reported, as amended, to their Lordships' House.

LEGAL INTELLIGENCE.

HANTS COUNTY ASSIZES.—July 1, 2, and 3.

(*Before Mr. Justice* BUCKNILL *and a Special Jury.*)

Giles v. Aldershot Urban District Council—An Accident while Painting a Lamp-Column.

This was a claim by a painter named Giles for £500 damages for injuries sustained by him through the negligence of the Aldershot Urban District Council; and the hearing of the case extended into three days. The plaintiff was in the employ of a Mr. Franklin, who contracted to paint certain lamps for the Council; and in August last he was engaged on the work. Plaintiff had painted between sixty and seventy of the lamps when he arrived at Ash Road. There he rested the ladder he was using against the arm of a lamp; and he alleged that the defendants having negligently allowed the arm to be insecurely fixed, it swung round, removing the support for the ladder, and causing him to fall on his back. Injuries to the spine had since incapacitated him from work. For the defence, it was argued that the accident was due to a latent defect, or a defect which no one could possibly detect; that the plaintiff was guilty of contributory negligence; and that the lamp arm only swung a short distance, and not sufficient to cause the accident to happen in the manner described.

Lord COLERIDGE, K.C., and Mr. FRANCKE appeared for the plaintiff; Mr. RUEGG, K.C., and Mr. ST. GERRANS for the defendants.

On behalf of the plaintiff, medical evidence was given to the effect that it would be necessary for him to undergo treatment by electricity and massage in London before he would get relief from his injuries. Other witnesses included a labourer named Novell, who stated that he was standing near when plaintiff was painting the lamp, and saw the arm swing and cause the ladder to fall. In cross-examination, however, Novell admitted that he was only the previous day called upon to give evidence, Among the witnesses for the Council were Mr. William Sugg, the maker of the lamp; Mr. Allan, Superintendent of the Aldershot Gas Company; Mr. Dennis, the Surveyor at Aldershot; Mr. William Titley, the Secretary of the Guildford Gas Company; and Mr. Hargreaves, Surveyor to the Farnborough District Council.

Mr. RUEGG, in his address to the Jury, pointed out that plaintiff sued the arm of the lamp-post for his own purposes; and he was not invited to use it. The Aldershot Surveyor had stated that if he had seen him doing so, he would have objected. It all came to whether they believed in substance the story told by the plaintiff or the theory set up by the defendants. He suggested that in reality the plaintiff knew little about how the accident happened—whether the arm swung round or not—and that it had been put into his head by his employer Franklin. Who ought to pay if the man had been injured? Undoubtedly the plaintiff had fixed on the wrong party in singling out the Urban District Council, for they were less to blame than any others. It was evident that Franklin had been anxious to escape liability, and had invented Giles's story for him. Everything pointed to this, and, most of all, the mysterious appearance of Novell from some remote village. He was a labourer who was actually picked up when the case had come into Court. It turned out, on the plaintiff's own statement, that he was never seen by the plaintiff. Then the plaintiff's witnesses had tried to make out that the arm would swing one way and not another, because of the existence of a burr. It had been contended that the Surveyor ought to have discovered that where the screws gripped it was not mathematically round; but for all practical purposes it was round. It was not reasonable to expect that the Surveyor would go up all the lamp-posts in Aldershot with a microscope. It was sufficient for him

to know that the lamp was perfectly safe from the road. There were no marks on the lamp where the screws had shifted. Doubtless it would be put forward that the weather had rusted them out; but the Jury would determine the probability of this. Franklin's story would have been more credible had some scratches been apparent. He thought it likely that the plaintiff reached too far over the lamp, and pushed the ladder off the end of the arm with a jerk; and this jerk might have caused the arm to move. But assuming that one of the screws was not sufficiently tight, could the blame be put on the Council? The Aldershot Gas and Water Company had always fixed the posts; and the only thing that could possibly be said against the defendants was: "If the arm was not properly fixed in this case by the Gas Company, you ought to have found it out." This particular arm had always borne the lamp-cleaner's ladder once a week, which showed it was strong enough for ordinary purposes. It might be asked whether Giles's master had neglected to provide him with proper plant, and so incurred liability. Whatever case he had against the Council, he had a stronger case against his own master. He contended there was some degree of contributory negligence. It appeared that for the purpose of painting other lamps in the town a double ladder was employed; and that should have been used by plaintiff for this particular lamp. Then he put himself in an unnecessarily dangerous position—so dangerous, in fact, that it resulted in an accident.

Lord COLERIDGE, for the plaintiff, said at the time of the accident the lamp was undoubtedly the property of the Council; and there must be some duties incumbent upon them as owners. When the Gas Company delivered over the lamp to the Council, it was impossible for the Council to say: "It is our lamp, but you are responsible for its defects." Was the liability of the Gas Company to go on for ever? No; the liability became the Council's as soon as the lamp became theirs. It was evident they had not shirked the duties possession entailed; for had they not employed an inspector to report defects? The painting was part of the maintenance obligatory on the Council; and they had to contract with Franklin to do it. In doing so, they practically said to Franklin: "Our lamps are safe for your painters." It would have been ridiculous had they said: "Paint our lamps, but at your own risk." Defendants might reasonably have supposed that the persons doing the painting would have done it by means of the usual ladders placed against the arms provided for ladders. It was the very plain duty of the Council to see that the arms were safe. The defendants' own witnesses had said the arm had been moved, and that an arm liable to swing would be dangerous. One said an arm ought not to move, and that it was easy to ascertain whether it was moveable by pulling it. No one on behalf of the defendants had applied this test before the accident; but the witness he had quoted had acknowledged that he had done so to most of the lamps since. No doubt it would be applied ever after.

His LORDSHIP in summing up the case, said the law was not quite simple. The structural neglect of the lamp was not that of the defendants; and the plaintiff had to make out that the defendants were liable in consequence of the neglect. Then he had to show that it was in consequence, and solely in consequence, of the negligence that he sustained the injury. In order to prove the Council's negligence, the plaintiff must prove that they had either done something which a reasonable person under the circumstances ought not to have done, or that they had omitted to do something that should have been done. But defendants could escape if they could prove that the accident was not solely due to their negligence—if they could prove that plaintiff himself was guilty of contributory negligence. The plaintiff's allegation of negligence was that the Council were in possession of the lamp; that they did not keep it maintained in a fit and proper condition; and that they allowed him to place his ladder against the arm when they knew it was not safe, or should have known it, by using due and reasonable care. Unfortunately, the facts were not easy to ascertain. If the story told by the plaintiff was true, there could be no doubt the arm was unsafe; and there had been no contributory negligence. The Surveyor's evidence was that if the man's story were true, he had the ladder so high that the top part was forced by the top of the lamp close to the knob at the end of the arm. It was very possible then that if he leant over to paint the side farthest from the ladder, his feet would push the ladder over the knob, and thus bring him down. If that was the case, and the Jury thought it was an improper thing to do, then plaintiff had been contributorily negligent. The ladder was not lashed to the arm, so it could have been pushed off by the man's feet, if he was in the position described. The point raised about the marks made by the screw as the arm swung round was important; but it must be borne in mind that the movement of the knob of the arm a quarter of the way round would only mean a movement of a fractional part of that distance by the screw at the other end of the arm. He inclined to the opinion that when the Council took possession of the lamp they were responsible for any defects in it. If there was a defect in it, and the defect was that a screw had been driven on to a burr, it could not be called a latent defect, as had been suggested. It must have been an obvious defect. But the Council were only bound to a reasonable extent to look after the condition of the lamp. It would be ridiculous for them to examine it minutely every week. Plaintiff had said he had got no higher on the ladder to paint than a man would do to clean the glass; but this could not be right, for he had to paint the metal top. Evidence had been given to show that the bye-pass had not been buckled; and this was the strongest possible evidence that the arm did not swing to the extent suggested. He thought it a pity that before the Council repaired the damage to the lamp plaintiff was not invited to see what they did to it. The obvious question was: Why was the arm repaired if it did not move? He directed the Jury to consider, in deciding if plaintiff was contributorily negligent, whether he was using an improper ladder, whether he was working at an unusual height, and whether he had the ladder improperly placed.

Lord COLERIDGE pointed out that the lamp cleaners did not lean their ladders against the side of the arm plaintiff did; and as the arm only swung one way, they were safe.

The Jury, after a short deliberation, returned a verdict for the defendants.

LORD MAYOR'S COURT.—Thursday, July 10.

(*Before Mr.* F. S. JACKSON, *Assistant Judge, and a Jury.*)

Robertson v. General Incandescent Company, Limited—Question of Costs in a Welsbach Patent Action.

In this case, Mr. Alexander Bruce Robertson, a plumber and electrical engineer, of Aberdeen, sued the above-named Company for £32 os. 8d.; being the amount paid by him as the taxed costs in certain proceedings taken by the Welsbach Incandescent Gas-Light Company against the plaintiff in the Scotch Courts, against which payment defendants had, it was alleged, agreed to indemnify him.

Mr. HERBERT JACOBS appeared for the plaintiff; Mr. GLASGOW represented the defendants.

The plaintiff's case was that in April, 1901, a person, who was said to be an agent of the defendants, called upon him for the purpose of selling their mantles. Upon being asked if there was any risk of proceedings being instituted by the Welsbach Company in taking up the mantles, the gentleman referred to a printed bill which had been previously sent to the plaintiff by the defendants, and to a printed guarantee which appeared on each box containing mantles, and said these documents were sufficient to protect the plaintiff against any loss. The bill in question stated, among other things, that users and sellers of defendants' mantles should ignore the Welsbach Company's empty threats, and, if attacked or intimidated, should communicate with the defendants or their Solicitors, when they would see that the Welsbach Company's interference was effectually checked in the future as it had been by the defendants in the past. The guarantee set forth that the mantle was not an infringement of any other patent. Eventually the plaintiff purchased a gross of mantles upon the terms that he should be indemnified against loss by any action of the Welsbach Company. Subsequently, proceedings were taken in the Scotch Courts by that Company to restrain plaintiff from selling the mantles in question, and the Company obtained an interim injunction against him. The cost of the proceedings were taxed at £32 os. 8d. The present defendants, who, in one of their letters, had undertaken to pay all expenses of the litigation, desired, notwithstanding the interim injunction, to continue the proceedings. The plaintiff, however, declined to go on unless a sum of money was deposited by the defendants to cover his costs in the matter. Eventually £50 was suggested by the defendants' Solicitor; but they themselves failed to deposit that or any other sum, contending that their guarantee to pay the costs was sufficient. Thereupon Mr. Robertson withdrew, and, being called upon to do so, paid the taxed costs, and the action was now brought to recover them under the guarantee.

Mr. GLASGOW submitted that there was no case to go to the Jury. He said the plaintiff sought to rely upon eleven letters in the correspondence as an indemnity, and had complained that the defendants had undertaken the litigation without communicating with him. But he (Counsel) failed to see where in the correspondence there was an offer and acceptance. The only letter that could be taken as an offer was one of the 19th of December, alluded to by the defendants: "We have received information from our Solicitor, Mr. Maclaren, with reference to the action against you by the Welsbach Company; and he has also sent us a copy of the letter in which you object to being made a party to any action. We beg to inform you that the Welsbach Company have not taken action against us, but against you; and as we presume that it is for selling our mantles, we wish to protect you, and have employed our Solicitor to defend the action. We will therefore ask you to instruct our Soliciior in this matter, which, of course, will be at our expense."

The ASSISTANT-JUDGE: Yes; and the plaintiff, I think very reasonably, said: "You deposit £50 as against my expenses, and then I do not mind your going on." What I propose to ask the Jury is, whether your Company indemnified the plaintiff against the proceedings that were taken in Scotland, and whether, if they did, that £50 was a reasonable condition. The plaintiff had undertaken the litigation on the guarantee of the defendants that they would pay.

Mr. GLASGOW: Assuming a guarantee to be good to protect any person against legal proceedings, you are entitled to go on to the bitter end, so long as you are acting reasonably.

The ASSISTANT-JUDGE: You might certainly have gone on to the bitter end.

Mr. GLASGOW: Yes; if he had allowed us.

The ASSISTANT-JUDGE: He would allow you; but he put a very reasonable condition. He said: "I do not know anything about your Company; lodge £50." Supposing the litigation had gone on against Mr. Robertson, and afterwards your Company had no assets. He would have been left to pay his own costs. He very reasonably asked the defendants to lodge £50.

Mr. GLASGOW: That is importing a fresh term; there is nothing about £50 in the agreement. The contract is: "I will trust you; I will give credit to you for paying the costs."

The ASSISTANT-JUDGE said he could not agree, and, after some further arguments, left the following questions to the Jury: (1) Whether it was reasonable or not for the plaintiff to ask the defendants to deposit the sum of £50 towards the costs of the further litigation; (2) whether the person who called on the plaintiff in April was an agent of the defendant Company; and (3) whether he entered into the contract with the plaintiff as contained in the circular referred to.

The Jury answered all the questions in the affirmative; and judgment was entered for the plaintiff for the amount claimed.

Mr. GLASGOW applied for leave to appeal.

The ASSISTANT-JUDGE declined to accede to the application, saying he would leave the defendants with whatever rights they had, but would not grant any others.

A stay of execution was eventually sanctioned for seven days, with a view to an appeal.

MISCELLANEOUS NEWS.

WELSBACH INCANDESCENT GAS-LIGHT COMPANY.

Directors' Report.

The report of the Directors of this Company for the year ended March 31 states that the members of the late Board retired on Jan. 22 last, and were paid their Directors' fees, and, in addition, a sum of £1500 was paid to Sir Henry C. Burdett, and £1000 to Mr. de Fonblanque as consideration for cancelling their respective agreements with the Company. The trade of the year under review shows an increase upon that of the preceding year; but owing to—(1) The large sum necessarily written off to meet insufficient depreciation of stock in former years; (2) the necessity for providing a suspense fund to meet losses arising out of engagements contracted in previous years; (3) further losses in connection with the Kern Burner Company, Limited; and (4) the diminution in the return upon the shares held in the Austrian Company, the net profit only amounts to £23,960. The Directors recommend that this amount, together with the sum brought forward from the last account, be carried forward. The dividend received upon shares in the Austrian Company amounts to £47,588, compared with £65,451 for the year ending March, 1901.

The Directors decided, shortly after taking office, that it would not be prudent or proper for them to make further unsecured advances to the Kern Burner Company, Limited. The balance of loss for goods supplied and cash advanced during the past year, amounting to £7805, has been charged to revenue. It is proposed that the Kern Burner Company shall be wound up, and that the Welsbach Company shall take over the Colonial patents; the original vendors, Messrs. Kern, Clamond, and Robinson, taking over the foreign patents. The first section of the new works at Wandsworth will be ready for occupation in the course of the current month. The present Board found that a variety of miscalculations had been made, which led to the completion of these works being retarded, and the cost estimated in the last annual report has been considerably exceeded.

The Board report that they have already largely reorganized the administration of the Company, and made considerable reductions of expenditure in practically every department. The retail branches of the business, which were carried on at a loss, and in direct antagonism to the trade, have been closed, and depôts in four leading centres—Glasgow, Manchester, Birmingham, and Belfast—have been substituted. A further reduction in the prices of both burners and mantles was made on July 1 inst.; and it is anticipated that these reductions will largely increase the volume of trade. The Welsbach mantle can now be bought by the consumer at 6d., and the Sunlight at 4½d.—the manufacture of these latter having been revived. With a view to a more extensive development of incandescent lighting, important arrangements have been made with Corporations and Gas Companies; and in connection therewith, licences to manufacture and import incandescent mantles have been granted on the basis of the payment of a royalty to the Welsbach Company. These arrangements have had the further advantage of reducing the costly and profitless litigation in which the Directors found the Company deeply involved. While entirely agreeing with the Advisory Committee that the Company is greatly over-capitalized, and that at the earliest possible date the capital should be adequately written down, the Directors suggest that any definite action should stand over until a better estimate can be made of the probable earnings of the Company under the new conditions.

In a separate circular, the Advisory Committee state that they consider that their mission has now been fulfilled. In one particular alone, it may be desirable that the Committee should still offer their assistance, when the question of the reduction of capital, as recommended in their report, has to be finally determined, for it is probable that the co-operation of the Committee, acting impartially on behalf of all classes of shareholders, may be of advantage to the Directors, as well as to the proprietors, and in the course of the ensuing financial year, it would appear to be urgent that this very difficult problem should be resolutely faced, and, if possible, brought to a satisfactory conclusion.

THE GAS ORDERS OF THE SESSION.

The two Bills to confirm Provisional Orders relating to gas undertakings having come down to the Commons from the Upper House, the Board of Trade have, as usual, issued Memoranda setting forth the nature of the proposals contained in the Orders.

The Orders in Bill No. 1 relate to Bothwell and Uddingston, Cirencester, Garw and Ogmore, Rothwell, Skegness, and Wellingborough. The Bothwell Order is to empower the Bothwell and Uddingston Gas Company to maintain, continue, and construct gas-works on the existing site, and to manufacture and supply gas within the parish of Bothwell, in the county of Lanark, and for other purposes. The Skegness Order is to enable the Skegness Gas Company to maintain and continue gas-works, and to manufacture and supply gas in the parishes of Skegness and Winthorpe, in Lincolnshire. The Wellingborough Order is to authorize the Wellingborough Gas Company to acquire additional lands by agreement, and construct further works. The Cirencester and Rothwell Orders are to sanction the raising of additional capital; and the Garw and Ogmore Order is to enable the Gas Company to vary their borrowing powers.

Bill No. 2 includes Provisional Orders relating to Bridge of Earn, Clay Cross, Harwich, and Hornsey. The first-named Order is to empower the Bridge of Earn Gas Company to maintain, continue, and improve their existing works, and supply gas within the village of Bridge of Earn, the parish of Dunbarney, and parts of the parishes of Perth and Forgondenny, in Perthshire. The Clay Cross Order is to authorize Messrs. William and Thomas Hughes Jackson to maintain and continue their existing gas-works at Clay Cross and Morton, in Derbyshire, construct further works in lieu of part thereof, make and supply gas, and raise capital for the purpose. The Harwich Order is to enable the Harwich Gas Company to raise more capital, extend their existing works, purchase additional lands by agreement. Similar powers to these are to be conferred on the Hornsey Gas Company by the Order for which they have applied.

MANCHESTER CORPORATION GAS SUPPLY.

The Complaint as to Big Gas Bills.

At the Meeting of the Manchester City Council last Wednesday, the subject of the complaints which have lately been made by gas consumers in regard to the increase in their bills was under discussion.

Alderman GIBSON, the Chairman of the Gas Committee, in introducing the matter, said it had been asked why he did not make some statement to satisfy the public thereon. First of all, however, he would ask who the "public" was; and he would give the Council a little information. During the eighteen or nineteen years he had been a member of the Committee, he had found that the normal number of complaints had been four per 1000 customers. In the last few months this four had increased 100 per cent.—to eight per 1000. They had 137,000 customers; so that they had had 1100 complaints, and the question was: Who was the public—the 1100 who had complained, or the 136,000 who had not? He was not concerned about the 136,000 righteous who needed no repentance; but he was deeply concerned for the 1100 who did. They had heard something lately about the promotion of a Gas Consumers' Protection Society. He could only say the Committee would heartily welcome such an Association, if it were the means of diffusing information on the question of gas consumption and gas-meters, the use of gas, how to economize, &c. Such an Association would be very helpful to the Gas Committee. The Committee gave such information now, printed on their gas-bills; but he very much questioned whether one in a thousand read these instructions. Why, it was asked, had they had such large gas bills lately? This, he supposed, was the pertinent question. His reply was that it was simply and solely in consequence of the extraordinary weather of the past six months. He would like to know if there was a single member of the Council who could recollect so cold and gloomy a six months up to the middle of June. He might instance a particular Sunday three or four weeks ago—a particularly dark and gloomy day, when everybody expected a great thunderstorm. On that day, just a million cubic feet more gas was consumed than on the corresponding Sunday of last year. The next day, Monday, was not quite so bad, but still dark enough; and he was sure nearly every business place in the city, and a great many houses, would have the gas burning very much more than if it had been a fine day. The consumption on that day was 1½ million cubic feet more—making 2½ millions extra in two days. At 2s. 9d. per 1000 this meant a good deal of money that somebody would have to pay. This sort of weather had obtained to a greater or less degree the whole of the six months; and his surprise was not that gas bills were large, and that the complaints had increased, but that bills were not larger and complaints more numerous than they actually were. Considering the abnormal weather, and the difficulties with which the Committee had had to contend in consequence, he did not think that, with only 1100 complaints from 137,000 consumers, there was anything to be very much alarmed about. He wished also to say a word about pressure and carburetted water gas. The pressures of gas to the various districts were fixed on a definite system. Portable automatic registers were placed at various points in the districts of supply to show the particular pressure required in each district at the time of greatest demand; and no more pressure was given than was required. At times, it had been as much as they could do to supply people with all the gas required at the ordinary normal pressure. On many occasions, unknown to members of the Council or to the public, they had, with all their vast resources, and with all their efforts, been within four or five hours of total darkness in the city, and they had been very thankful when relief came. When it was suggested that they put on extra pressure for the purpose of selling more gas, he must remind them that extra pressure meant extra leakage from the mains, and, as a matter of fact, there was only the normal percentage of leakage. One gentleman had asked the difference in the amount of gas burnt if they gave him gas at 23-10ths instead of 22-10ths. Well, he had spoken to Mr. Newbigging, and that gentleman informed him that if they increased the pressure 100 per cent., the consumption would be 50 per cent. more. It would therefore appear that, if the pressure was raised as stated, the increase in consumption would be almost imperceptible. As to carburetted water gas, it was just as pungent as ordinary coal gas. The analysis showed that it contained only the elements present in ordinary coal gas. The volume and registration in the meters were precisely the same; and instead of being an adulterant, as some people seemed to think, it was the very antipodes of that. They put it in for the purpose of getting a higher illuminating power in the gas—to enrich it. It was very extensively used in America; 75 per cent. of the whole of the gas burnt in New York was water gas. It was sometimes asserted that they pumped air into the pipes. This was quite untrue. His own private gas bill, he might mention, was £5 more this quarter than ever before. This was for Stretford gas; and he had never even heard that Stretford possessed a machine for the purpose of pumping air. His Committee kept chemists at each of the works for the purpose of testing the gas sent out to consumers; and one particular point was that no particle of air should get into the gas, because 5 per cent. of air present

meant 50 per cent. less illuminating power. It was therefore absurd to suggest that they pumped air into the mains.

Mr. F. BROCKLEHURST said he hoped the Chairman would not measure the amount of public feeling on the question by the number of complaints received. It had been stated to him, by some one acquainted with what he was talking about, that carburetted water gas was of less specific gravity than gas manufactured from coal, and when water gas was used, a greater quantity, presumably, was registered, because of the difference in gravity, than would be registered with pure coal gas. If this were so, they had one reason, perhaps, why the gas bills were abnormally high. Was that a statement of fact, or not?

Mr. H. HEENAN observed that if a large percentage of water gas was being used, the ratepayers were being robbed. They paid according to the bulk, and in efficiency would only get part of what they were paying for. He suggested that a small gasholder, to hold about 10 cubic feet, should be bought, to be taken round to the houses of consumers complaining of wrong measurement, and the meter tested by allowing the gas to flow through it.

Alderman GIBSON replied that they had very carefully tested the flow of water gas and ordinary gas through different meters, and the register was exactly the same. He was not aware that Mr. Heenan was an expert in gas matters; but in any case he was entirely wrong. If Mr. Heenan would call upon him, he would be glad to give him the information which was necessary for him to state what was in accordance with fact. As to the testing of gas-meters, when a complaint was made, they sent a competent man to examine and report. If he found the meter and fittings in order, they gave the complainant the option of having the meter tested by independent persons under the control of the City Magistrates—with whom the Gas Committee had nothing to do. If the meter was found to be right, the consumer must pay for the testing; and if found incorrect, the Committee bore all the expense, and made an allowance for the wrong done. They did the utmost they could to satisfy any right-minded, fair-dealing person.

Ultimately the Committee's proceedings were unanimously approved.

SALFORD CORPORATION GAS SUPPLY.

The Annual Accounts.

In the last number of the "JOURNAL" the report of the Gas Committee of the Salford Corporation for the year ending March 31 was noticed. We have since received a copy of the accounts for this period, and take the following particulars therefrom: The capital account was increased last year by £28,446; making with the balance in hand on March 31, 1901, a total of £30,018. The expenditure on this account amounted to £25,860, of which £8512 was for main and service pipes, and £9169 for prepayment meters. The revenue from the sale of gas for public and private lighting (less discounts) amounted to £191,460; stove-rental came to £2520; the sale of residuals produced £51,205; and the total receipts were £245,638. The following were the principal items of expenditure: Manufacture of gas, £143,178; distribution, £11,100; rent, rates, and taxes, £11,637; management, £6878—the total being £174,898. The balance carried to the credit of the profit and loss account was consequently £70,740. This sum had to bear the following amounts: Interest and annuity, £20,090; redemption of loans, £14,465; and depreciation, £15,000—leaving a balance of £22,395 as the net profit for the year, which was transferred to the district fund account.

PUBLIC LIGHTING OF PLYMOUTH.

Mr. E. G. Okell, the Electrical Engineer of the borough of Plymouth, has prepared a report on the public lighting of the town, which was considered at the meeting of the Town Council yesterday. He says that before the year 1897 nearly all the gas columns, lanterns, and burners were owned by the Plymouth Gas Company, by whom they were lighted, extinguished, kept in repair, and supplied with gas at a fixed charge per annum varying from £8 15s. 9d. to £2 11s. 3d., according to the size and candle power of the lamps—the burners in use being of the ordinary fishtail pattern. In October, 1897, the Chairman of the Works Committee, the Town Clerk, and the Borough Surveyor were authorized to negotiate with a view to securing improved arrangements for street lighting. Mr. C. R. Bellamy, of Liverpool, was called in to give advice on the subject and negotiate with the Gas Company. An arrangement was entered into whereby the Company handed over to the Corporation all the columns and brackets in service on Dec. 31, 1897, for the sum of £2500. It was further arranged that the lanterns should be left temporarily for the use of the Corporation, that the lighting and maintenance of the lamps should be handed over to the control of the Corporation, and that the gas should be supplied on the governor and regulator principle of measurement; the price being the ordinary current rate, less 5 per cent. discount. Mr. Bellamy reported in May, 1898, in favour of converting the gas lighting of the town to the incandescent system. The whole of the street lighting was transferred to the Electricity Committee, whose name was changed to the Electricity and Street Lighting Committee, who installed about 100 incandescent lamps of various types for the purpose of testing them in practical use and over a reasonable period. On Sept. 22, 1898, the electricity supply was commenced, and 72 arc lamps were brought into use, displacing the gas-lamps in the main thoroughfares and on the Hoe—adding greatly to the illumination in those places. After careful comparison of the different types of incandescent lamps, the Committee adopted the recommendations of Mr. Rider, who was then the Electrical Engineer, and decided to convert to the incandescent system the whole of the 1924 ordinary lamps at the time in use. It was estimated that this would have the effect of increasing the nominal illuminating power from 32,226 to 87,480 candle power, and at the same time result in a saving of £700 a year in gas. Tenders were invited for the supply of lanterns, burners, &c.; and the contract was finally let to the Welsbach Company. In the autumn of 1900, less than six months after the acceptance of the tender, the whole of the public gas lighting of the town had been changed to the new system; the work of conversion being carried out by men in the direct employ of the Corporation, under the immediate control of the Street Lighting Superintendent (Mr. T. Williams). The conversion entailed the testing and adjustment of all the burners to suit the pressure of gas in different parts of the town—a task requiring great skill and patience on the part of the Street Lighting Superintendent, who deserves much credit for the manner in which it has been carried out. Immediately upon the extension of the gas-mains to the Laira district, the oil-lamps formerly in use there were removed, new lanterns being fixed and incandescent burners installed. This work, which was done gradually as the pipe extensions were laid, was completed on the 27th of January last.

The following table shows the effect of the conversion, both from a financial and an illuminating point of view:—

Year.	Cost for Year.	No. of Lamps.	Total Candle Power at End of Year.	Cubic Feet of Gas.	Cost per Candle Power.
March 31, 1899. Last year of old arrangement.	£6206 16s. 8d.	1972 gas 58 oil 2030 total	32,746	Unknown.	45·5d.
1900. Transition period.	£6161 13s. 8d., including £500 to suspense account.	1970 gas 58 oil 58 arc 2286 total	121,524	34,466,914	12·1d.
1901. First year of new system.	£6433 14s. 6d., including £650 to suspense account.	2062 gas 58 arc 58 oil 2178 total	180,708	26,367,874	8·5d.
1902.	£6615, including £650 to suspense account.	2207 gas 58 arc 2265 total	185,680	23,137,643	8·4d.

As to the cost of taking over and converting the gas and oil lamps to the incandescent system, it appears that the outlay, including the £2500 paid to the Gas Company for the old columns, brackets, &c., and £2700 under the original contracts for new lanterns and burners, amounts now to a total of £6730. This was treated by the Corporation as a suspense account, and £1805 has been paid off; reducing the balance outstanding to £4925. The estimated expenditure for the year 1901-2 was £6200. The actual expenditure was £5965, of which £1224 was for arc lamps, £2229 for gas, £2112 for labour, maintenance, &c., and £250 for salaries, &c. For the current year the expenditure is estimated at £6300, which is to include £350 for additional lanterns, posts, &c. In the year 1901-2 there were used 5000 lanterns of No. 2 size, and 1300 of No. 4 size—a total of 6300.

Mr. Okell appends to his report the following statement of the comparative costs of street lighting:—

	Actual Cost, 1901-2.	Cost of Flat-Flame Burners. Under Corporation Management.	Under Old Management.
Arcs	£1224	£1224	£1224
Gas	2229	3700	6362
Labour and Maintenance	2112	1916	
Painting posts	150	150	—
Salaries	250	250	—
	£5965	£7240	£7580

He adds that, in addition to the improvement effected in lighting, attention has also been given to the position of the employees, who, by increased wages, sick pay, holiday leave, and the provision of headquarters where they may assemble under cover, find their condition much improved.

WIDNES GAS AND WATER SUPPLY.

The Past Year's Working.

At the Meeting of the Widnes Town Council last Tuesday, the Chairman of the Gas, Water, and Electricity Committee (Alderman Timmis), in moving the adoption of their minutes, made a few remarks on the working of the gas and water undertakings, which are under the supervision of Mr. Isaac Carr, M.Inst.C.E. He stated that the gross profit realized from the gas-works during the year ending March 25 last, was £2793; and after deducting £1624 for public lighting, there was left a net profit of £1169. He reminded the Council that, unlike the majority of the towns throughout the United Kingdom, Widnes did not raise the price of gas during the time of the great rise in coal, which had doubled in price during the last two years; and the charge for gas in Widnes to-day was still lower than in any other place in the United Kingdom. The gas consumption last year started badly, and at one period there was a decrease of nearly 5 per cent. as compared with the previous twelve months. The gas consumption, however

increased, and at the close of the year 251 million cubic feet had been made, compared with 244 millions during the previous year—an increase to the extent of 3 per cent. With regard to the current year, so far as it had gone, the increase amounted to 10 per cent., which was the largest they had had since 1898; and if this rate continued, it would be necessary in the near future to consider the need for enlarging the gasholder capacity. The maximum of consumption during the coming winter, calculated on the above rate of 10 per cent. increase, would be greater than the holder capacity. Respecting the coal contracts, the average worked out at 4s. 6d. per ton less than the 1900 prices, when they were at their highest. As to the water undertaking, the consumption during the twelve months had been 891,492,961 gallons, while the gross profit was £1333 15s. 11d., or deducting the cost of the water for the Fire Brigade (£228 5s. 4d.) a net profit of £1105 10s. 7d. This profit was made notwithstanding the fact that for the whole year there was a decrease of nearly 3 per cent., compared with the previous twelve months; and at one period of the year it was quite 11 per cent. So far as the consumption in the current year was concerned, it showed a substantial increase of 8·7 per cent. Alderman Timmis added that he thought the Council would find these figures entirely satisfactory. The Committee had no proposition to put forward. When they were able to judge better how things were going on, they would submit one which he trusted would meet with the Council's approval. With respect to a resolution on the minutes granting Mr. Carr permission to take pupils and accept premiums in respect of them, Alderman Timmis explained that it was in accordance with the practice in other places, and said he believed the arrangement would prove advantageous to the Corporation. The minutes were approved.

LONGTON GAS AND ELECTRICITY SUPPLY.

At the Meeting of the Longton Town Council last Thursday, a report was presented on the working of the gas undertaking for the nine months ending the 31st of March. It set forth that there had been a net decrease in the sale of gas to the extent of 1,529,900 cubic feet—an increase of 2,390,800 cubic feet on slot-meter consumption, against a decrease of 3,920,700 cubic feet on ordinary meters. A falling off to the extent of 2,000,000 cubic feet had arisen through the introduction of the electric light, and of 250,000 cubic feet on the factories, in spite of the increased use of gas for motive power. From the 1st of October last, the price of gas to ordinary meter consumers was reduced by 3d. (making the net price 3s. 1d. per 1000 cubic feet), and to slot-meter consumers by 4d. The revenue from private rental had decreased by £878 1s. 11d.; and that from public lighting had increased by £52 1s. 6d. The proportion of water gas made had been nearly 25 per cent. The cost per 1000 cubic feet compared favourably with that made from coal; and the Committee stated that they had secured a contract for oil at a price which would still further reduce the cost. They expressed regret that the cost of coal, less the sales of residuals, had increased on the corresponding period of the previous year by 11d. per ton. The price of coal was reduced by the colliery proprietors 2s. 6d. per ton, or 16 per cent.; while the price of coke fell 50 per cent., and the price of tar 33 per cent.—the reductions on residuals more than counterbalancing the reduction on coal. In spite of these adverse circumstances, the Committee had been enabled to realize a working profit of £6155; and after deducting interest and sinking fund charges (£4727), there remained a balance of £1428. This, with the amount brought forward from June 30, 1901, made a total of £1496, which the Committee recommended should be paid over to the borough fund. They said the result of the working of the plant and the management (under Mr. W. Langford), as apart from prices of material, had been eminently satisfactory, and showed an advance on previous years. The number of cooking and heating stoves sent out continued to increase, 1204 being in use on March 31, against 1078 on June 30 last year. Since the exhibition in April, 200 more stoves had been fixed. The Committee reported that the working profit on the electric light station for the half year amounted to £382 7s. 5d., the interest on capital was £357 4s. 4d., and the proportion of sinking fund £274 5s. 6d.—leaving a deficiency of £249 2s. 5d., to which had to be added the accumulations of interest previous to the starting of the station, amounting to £177 9s. 3d. The Committee had had before them an application from the China Manufacturers' Association for a reduction in the charge for gas for power purposes, and they recommended that the price be lowered 6d. per 1000 cubic feet; making it 2s. 9d., less 5 per cent. on the usual conditions. The report was adopted.

THE EXTENSIONS AT THE STOKE GAS-WORKS.

An Official Inspection.

At the invitation of Alderman F. Geen, Chairman of the Stoke-upon-Trent Corporation Gas Committee, there was a large gathering at the gas-works last Tuesday, on the occasion of the completion of the extensions and improvements which have been going on for the last eight or ten years, to which reference was made in the "JOURNAL" last week (p. 102). Among those present were the Mayor (Mr. T. R. Yoxall) and most of the members of the Corporation, the Gas Engineer and Manager (Mr. W. Prince), the Mayors of Longton and Burslem, and a number of Chairmen and Engineers of gas undertakings in the neighbourhood. Alderman Geen and Mr. Prince conducted the party round the works, and pointed out the nature and extent of the alterations. Alderman Geen said that in the whole of the buildings there was not a brick standing which was there eight years ago, with the exception of the offices, and yet the undertaking had been practically remodelled and reconstructed without interfering with the process of gas manufacture. In all directions great improvements had been effected—in fact, the undertaking had been made quite a model gas-works. When the party were in the engine-house, Alderman Geen explained that the engines had been repaired; the Committee thinking that they would last some years longer. Having been repaired, and various improvements introduced, they had worked most satisfactorily since. The boiler-house had been taken down and another erected in its stead, two additional boilers being added; and he also pointed out that they had built an employees' mess-room and a bath-room. Coming to the retort-house, he stated that this building was now large enough for three more beds of retorts. They had at present seven beds. The old retort-house had ten; but they did not make so much gas as five of those now in use. Consequently, the new house would have at least double the capacity of the old one. Turning to the purifying-house, he explained that the Committee had put down four new purifiers. Formerly they had four small ones, very old and dilapidated. In the extension scheme the Committee provided for four new purifiers, two of them on the latest principle—Green's patent rubber-jointed—and the other two with the ordinary water-lute. All four were 25 feet square each. The company next inspected the new station meter; Alderman Geen explaining that the old one was altogether too small, and moreover unreliable. The present meter (one of Braddock's) would pass 50,000 cubic feet of gas per hour, and had cost £630. In addition, there was the new house and the foundation; so that the meter and the house had altogether cost about £800. The governor-house was next visited, and Cowan's governor shown, and its action described. Coming to the holders, Alderman Geen stated that the new one—with three lifts—had cost between £4000 and £5000. It had a capacity of about 450,000 cubic feet; while the other would hold about 400,000 cubic feet, or about a day-and-a-quarter's supply—taking a maximum day. Up to the time of the visit, no gas had gone from the new holder into the town; and Alderman Geen started the immense structure on its career of usefulness by turning the gas on. Messrs. W. C. Holmes and Co., of Huddersfield, were the Contractors for the holder, the purifiers, and the rotary washer-scrubbers. We understand that the total cost of the improvements has amounted, in round figures, to rather less than £30,000. After the inspection, the party were driven to the residence of Alderman Geen, where they were entertained to luncheon, followed by a garden party. A pleasing incident of the function, as mentioned in our "Personal" column, was the presentation of a testimonial to Alderman Geen.

THE MANAGEMENT OF THE NEWRY GAS-WORKS.

At the Monthly Meeting of the Newry District Council, the Gas Committee reported that immediately on their appointment in February last, they felt that a thorough investigation into the management of the gas-works was necessary, owing to frequent complaints from ratepayers as to the quality of the gas and want of sufficient pressure, and as it was generally considered that the price of gas, especially for motive purposes, was too high. Mr. Isaac Carr, of Widnes, was consequently appointed to make the investigation; and the Committee now submitted his report. Mr. Carr considered the state of the works and plant fairly satisfactory, and that, with a comparatively small expenditure and some changes, a very considerably better result, both as to the quality and price of the gas, and also as to the financial condition of the concern, might be attained. It was also mentioned that Mr. Andrew Gibb, the Manager, had tendered his resignation, and that the Committee had decided to recommend the Council to make him an allowance of £93 15s. per annum for life. They had also advertised for a thoroughly qualified manager, to whom a liberal salary would be paid. The report was, after considerable discussion, unanimously adopted.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold, by order of the Directors and others, stocks and shares in the Southend Water Company, and the North Middlesex, Harwich, Dorking, and Chigwell Gas Companies. The new issue by the Southend Water Company was such an amount of 4 per cent. perpetual debenture stock as would realize £8032; and the £100 lots fetched from £110 to £112 each. The next lots consisted of £10 ordinary shares in the North Middlesex Gas Company, ranking for a dividend of 7 per cent. per annum, subject to the sliding-scale (the last dividend having been at this rate). Of the 30 lots put up, 9 were sold at £13 12s. 6d., and 21 at £13 10s. each. Some 4 per cent. perpetual debenture stock of the Company was sold at par. An issue of £5 shares in the Harwich Gas Company, ranking for a maximum dividend of 7 per cent., but entitled to 6 per cent. (the last dividend paid on similar shares), was placed at £5 10s. per share. A few £25 "D" shares in the Dorking Gas Company, entitled, in view of the last dividends paid by the Company, to receive 5 per cent., were sold at par. The last item in the particulars was a few £10 shares in the Chigwell, Loughton, and Woodford Gas Company (last dividend 7 per cent.); and they were sold for £13 apiece. On Thursday, Messrs. Alexander, Daniel, and Co. sold by auction £15,000 of Bristol Water-Works 7 per cent. maximum consolidated ordinary stock. The dividend is subject to proportionate diminution whenever the maximum dividend to which each class of ordinary shares or stock of the Company is entitled shall not be paid in full; but such diminution may be made up in subsequent years. The highest price realized was £152 15s., and the lowest £152; the average being £152 6s. 2d. per £100 of stock. With the object of enlisting the support of local investors, the Plymouth and Stonehouse Gas Company arranged for a sale of stock locally instead of in London as has been their recent custom. The sale took place last Tuesday, when £10,000 of the ordinary stock was offered by Messrs. Woolland and Son. The experiment was only a qualified success, for the total amount sold was but £4100; the price realized being £127 per £100.

ELECTRIC LIGHTING NOTES.

Favouring the Public Lighting.

The Ashton-under-Lyne Corporation have confirmed a proposal by the Electricity Committee to charge a price of 2½d. per unit for electricity supplied for public lighting. To all other Corporation departments, the cost will be 3½d. per unit; but to private consumers for lighting 4d. per unit, or ultimately 1s. per 8-candle power lamp per quarter, and, in addition, 1½d. per unit. For current for power purposes, 1½d. per unit is the price fixed.

An Unprofitable Installation at Stepney.

The "East London Observer" last Saturday contained a special article on the recently published accounts of the electric light undertaking of the Stepney Borough Council, which, it may be remembered, is an extension of the Whitechapel installation. Put concisely, it shows that a very large portion of the capital expenditure of £114,000 is gone, and that little or no attempt has been made to replace it by a liberal allowance for depreciation. Our contemporary remarks that "the most casual examination will reveal the facts that the Council have spent £2700 on electricity, and saved £1100 in gas in lighting a few thoroughfares; that the electric light consumers are getting their current under cost price; and that undoubtedly the long-suffering ratepayer will be called upon to make good the loss." The writer trusts his interpretation is erroneous; but, on the first published accounts of the Electricity Department, any other conclusion seems impossible.

The Free Supply of Electricity at South Shields.

In the "JOURNAL" for the 10th ult., reference was made to the objection taken by the South Shields Gas Company to the action of the Corporation in granting a free supply of electric current to new customers during the months of May, June, and July. The idea which animated the municipal authority in coming to this decision was that a tempting offer of the kind mentioned would act as an inducement to many tradesmen and householders to become customers of the Corporation; and it seems that the offer has not been made in vain. A large number of new consumers have been obtained, and it is believed that many more premises will be connected before the end of the current month, when the privilege will be withdrawn. The Company, it may be remembered, have been advised to apply for an injunction to restrain the Corporation from carrying out their intention; and correspondence between the parties took place on the subject some weeks ago. We learn from a local paper that a further letter has been received by the Electricity Committee from Mr. Purvis, the Company's Solicitor, asking that they, through their agent, may be allowed to examine the books of the department relative to orders for electric lighting under the conditions objected to. Another Solicitor (Mr. V. Grunhut) has also written to the Committee, stating that, as a consumer of long standing, and as a ratepayer, he protests against the Corporation granting privileges to others which have never been extended to the original or subsequent customers. Nor does he see why, as a ratepayer, he should have to pay for the electric energy which the Corporation think fit to give as a present to intending consumers during May, June, and July. In the event of any new customer receiving such benefit, he will decline to pay his next quarter's account, in order that the matter may be tested. The Committee decided to decline the application of the Gas Company, and instructed the Town Clerk to simply acknowledge Mr. Grunhut's letter.

KIDDERMINSTER WATER SUPPLY.

Proposed Additional Works.

The Kidderminster Water Question, which in different shapes has occupied attention for a long time, came last Tuesday before a special meeting of the Town Council, convened to consider the final report of Messrs. Willcox and Raikes, with plans and estimates, for additional works, and (if approved) to apply to the Local Government Board for sanction to a loan of £18,000 for carrying it out. Alderman Parry (Chairman of the Drainage and Water-Works Committee) brought up a report, which set forth that the completed plans and estimates considerably supplemented and extended the scheme as proposed by the late Mr. Comber, and the Committee recommended the adoption of the final scheme. He said it was just thirty years since the Town Council of that day spent £45,000 on a scheme of water supply, and at the same time carried out a sewerage scheme. It was subsequently found an adequate supply of water could not be obtained in seasons of drought or frost. A crisis came in 1899, when for 174 nights the water had to be cut off at night. This led to the scheme for a new well near the lower well. Mr. Comber estimated that the work would cost £6000. On Mr. Comber's death, Mr. Willcox was called in; and he reported that it could not be carried out for less than £9000. It was deemed desirable to execute other works besides those at first contemplated; and the final scheme as now presented would entail an outlay of £18,000. This the Committee recommended should be adopted, and he moved a resolution embodying the proposal. Alderman Hepworth seconded the motion. Mr. Taylor said that they had only had the scheme before them for two days, and the time was not sufficient to thoroughly consider it. There was no danger of a water famine in Kidderminster. There was the Birmingham water-main within two miles; and they had a right to take water from it if they wished. He moved an amendment that the matter should be deferred for six months. Mr. M. Smith seconded this. Alderman Pensotti asked, if a new supply were needed, whether they were starting in the right place for the well. Mr. Willcox replied that in his opinion they would get the water they needed from the new borehole. Alderman Pensotti asked if the site was the best one for the well. Alderman Parry said it was

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 145.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb.	100—102	..	4 18 0
200,000	5	May 14	6½	Bombay, Ltd.	6—6¼	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¾—4¾	..	5 9 5
380,000	Stk.	Feb. 13	12	Brentford Consolidated	255—260	..	4 12 4
270,000	,,	,,	9	Do. New	189—194	..	4 12 9
50,000	,,	,,	5	Do. 5 p.c. Pref.	128—133	..	3 15 2
206,250	,,	June 12	4	Do. 4 p.c. Deb.	111—114	..	3 10 2
220,000	Stk.	Mar. 13	10	Brighton & Hove Orig.	205—210	..	4 15 3
246,320	,,	,,	7	Do. A. Ord. Stk.	148—153	..	4 11 6
460,000	20	Apl. 11	10	British	39—41	..	4 17 7
50,000	10	Feb. 13	12	Bromley, Ord. 10 p.c.	23—25	..	4 16 0
82,850	10	,,	9	Do. 7 p.c.	18—20	..	4 10 0
500,000	10	May 14	6	Buenos Ayres (New) Ltd.	9¾—10¼	..	5 14 3
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
150,000	20	July 11	8½	Cagliari, Ltd.	21—23*	+½	7 3 6
100,000	10	June 12	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54—56	..	5 7 2
550,000	Stk.	Apl. 11	12	Commercial Old Stock	265—270	..	4 8 11
251,875	,,	,,	9	Do. New do.	205—210	..	4 5 9
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130—134	..	3 7 2
800,000	Stk.	May 28	8	Continental Union, Ltd.	138—143	..	5 11 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	147—152	..	4 12 1
575,000	Stk.	Feb. 27	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127	..	3 18 9
91,140	,,	July 11	5	Do. 5 p.c. Deb. Stk.	138—141*	..	3 10 11
486,090	10	Jan. 30	10½	European, Ltd.	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,243,200	Stk.	Feb. 13	4⅛	Gas-light and Coke: 4 p.c. Ord.	94—96	..	4 11 8
2,600,000	,,	,,	3½	Gas-light and Coke: 3½ p.c. max.	90—92	..	3 16 1
3,799,735	,,	,,	4	Gas-light and Coke: 4 p.c. Con. Pref.	111—113	..	3 10 10
4,193,975	,,	June 12	3	Gas-light and Coke: 3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	May 14	10	Imperial Continental	203—206	..	4 17 1
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 27	10	Liverpool United A	220—222	..	4 10 1
718,100	,,	,,	7	Do. do. B	166—168	..	4 3 4
306,083	,,	June 24	4	Do. do. Deb. Stk.	116—118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd.	4¼—4¾	..	5 5 3
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	106—110	..	4 10 11
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	June 12	5½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,892	Stk.	Feb. 21	4⅜	Newc'tle & G'tesh'd Con.	105—106	..	4 2 7
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
150,000	5	May 28	8	Oriental, Ltd.	7—7½	..	5 6 8
135,000	4½	,,	8	Do.	6—6¼	..	5 10 9
15,000	1	,,	8	Do.	1⅞—1⅞	..	4 11 5

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Mar. 13	7	Ottoman, Ltd.	6⅛—6⅜	..	5 3 8
851,070	10	Apl. 25	7	River Plate Ord.	10—10⅛	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—96	..	4 3 4
250,000	10	Mar. 26	8	San Paulo, Ltd.	12—13	..	6 3 1
135,000	Stk.	Mar. 13	10	Sheffield A	239—241	..	4 3 0
209,984	,,	,,	10	Do. B	238—240	..	4 3 4
523,498	,,	,,	10	Do. C	237—239	..	4 3 8
5,850,000	Stk.	Feb. 13	5	South Met., 4 p.c. Ord.	121—124	..	4 0 8
1,627,965	,,	July 11	3	Do. 3 p.c. Deb.	92—94*	+⅛	3 3 10
380,940	Stk.	May 14	5	Southampton Ord.	102—106	..	4 14 4
87,950	,,	July 11	4	Do. 4 p.c. Deb.	100—103*	+2	3 17 8
120,000	Stk.	Feb. 27	5½	Tottenham and Edmonton: A. 5 p.c.	120—125	..	4 8 0
260,520	,,	,,	4	Tottenham and Edmonton: B. 3½ p.c.	95—100	..	4 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.	7—8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95—98	..	5 2 0
230,000	5	Mar. 13	9½	West Ham, 10 p.c.	10—11	..	4 1 10
172,000	10	,,	6½	Do. 7 p.c.	13—14	..	4 5 8
				WATER COMPANIES.			
780,599	Stk.	June 24	11⅝	Chelsea, Ord.	300—310	..	3 14 2
150,000	,,	,,	5	Do. 5 p.c. Pref.	152—157	..	3 3 8
160,000	,,	,,	4¼	Do. 4¼ p.c. Pref. '75	140—143	..	3 2 11
175,785	,,	Mar. 26	4¼	Do. 4¼ p.c. Deb.	140—145	..	3 2 1
1,720,560	Stk.	Mar. 26	8	East London, Ord.	215—220	..	3 12 9
654,740	,,	June 12	4¼	Do. 4¼ p.c. Deb.	142—147	..	3 1 3
1,018,046	,,	,,	3	Do. 3 p.c. Deb.	96—98	..	3 1 3
700,000	50		8	Grand Junction: 10 p.c. max.	112—117	..	3 8 5
310,000	Stk.	Mar. 26	4	Grand Junction: 4 p.c. Deb.	127—130	..	3 1 7
708,000	Stk.	Feb. 13	16	Kent	290—300	..	5 6 8
160,000	,,	,,	7	Do. New, 7 p.c. max.	200—210	..	3 6 8
1,043,800	100	June 24	11	Lambeth, 10 p.c. max.	295—305	+5	3 12 2
406,200	100	,,	8½	Do. 7½ p.c. max.	210—220	..	3 17 3
350,000	Stk.	Mar. 26	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
500,000	100	Feb. 13	12⅝	New River, New Shares	400—410	..	3 2 5
1,000,000	Stk.	Jan. 30	4	Do. 4 p.c. Deb.	127—132	..	3 0 7
902,300	Stk.	June 12	7	South-wark and Vauxhall: Ord.	190—195	..	3 11 10
126,500	100	,,	7	South-wark and Vauxhall: 7½ p.c. max.	180—185	..	3 15 8
489,200	Stk.	,,	5	South-wark and Vauxhall: 5 p.c. Pref.	152—157	..	3 3 8
1,019,585	,,	Apl. 11	4	Vauxhall 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	June 12	10	West Middlesex	275—285	..	3 10 2
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	139—144	..	3 2 6
200,000	,,	Mar. 13	3	Do. 3 p.c. Deb.	95—97	..	3 1 10

* Ex div.

as good as they could have. Some thought a site at Foley Park would be free from the sentimental objection that was made to the present site. Dr. Moore said there had not been any argument used against the scheme. If they went to Foley Park to put the well they might have a flaw through which sewage might make its way. There was a time when he believed an accident happened at the lower well, because a sewage-pipe ran through the well and leaked into it; but when the pipe was removed there was no complaint. He had taken a sample of the water, and it was one of the purest he had seen. Mr. Weston remarked that the Engineer was not responsible for the selection of the site for the new well. He was consulted as to carrying out a scheme at a site already adopted, where the borehole had been made. They were going down at this spot through 15 or 20 feet of town refuse, and were on the wrong spot altogether. He would rather go to £30,000 of expense on a new site than spend £18,000 at a spot where the money might have to be thrown away. It might be a matter of sentiment, but they all preferred the water from a spot free from objection. Mr. Tomkinson said if the Local Government Board decided that the spot was not a suitable one, they would not sanction the loan. After more than two hours' discussion, the amendment was lost by a majority of one; and the resolution was afterwards carried by 12 votes to 10.

CHELMSFORD WATER SUPPLY.

A New Scheme.

A Special Meeting of the Chelmsford Town Council was recently held to consider the question of the water supply of the borough; and a long report was presented by Mr. Percy Griffith, M.Inst.C.E., who, as stated in the "JOURNAL" some months ago, had been called in to advise the Sewer and Water Supply Committee on the matter. It set forth that the total (minimum) supply to the borough at present is 182,000 gallons, made up of 72,000 gallons from the old well and the borings at Mildmay Road, 30,000 from the Burgess well gravel springs, and 80,000 from Admiral's Park. With a population of about 13,000, this is equal to 14 gallons per head per day. The present available supply is inadequate for the town's requirements, and immediate steps should be taken to increase it. Mr. Griffith recommended the abandonment of the proposed well, and the use of the boring itself for a permanent supply, and advised that permanent plant should be installed as early as possible. The report detailed the plant required. With regard to the Admiral's Park supply, Mr. Griffith is of opinion that by lowering and extending the collecting works, an increased supply may be obtained. In connection with the development of this supply, he recommended that arrangements should be made to convey the water obtained there to the Mildmay Road pumping-station, and to dispense with the gas-engine and pumps now used in connection with the former station. His schemes provide for an estimated yield of 240,000 gallons per day from the new boring, and 120,000 gallons from the gravel beds at Admiral's Park. Neither of the sources dealt with is capable of any considerable further development than that suggested; and the only additional sources of supply open for serious consideration are further gravel beds in the immediate neighbourhood, and a second boring into the chalk; but Mr. Griffith suggested that the question of further sources of supply should be deferred until certain observations had been carried out. His approximate estimate of the cost of the works is £16,000. The Committee's recommendations were as follows: (1) The new boring to be increased to a further depth of 100 feet, at an estimated cost of £160. (2) The erection of permanent plant, at an estimated cost of £8100, to include two new boilers and settings with economizers, £2000; engine, force-pumps, headgear, bore-hole pump, condenser, and accessories, £3000; reservoir (40,000 gallons), with settling-tanks, &c., at Mildmay Road, £600; engine and boiler-house, foundations, &c., £2500. (3) A 10-inch main from Mildmay Road to the reservoir at Long Stomps to be included in the estimate and scheme for the enlargement of the reservoir at Long Stomps; the Surveyor to be instructed to prepare plans for this scheme as soon as the contract for the purchase of the land was signed. (4) That the question of obtaining a further supply from Admiral's Park be deferred.

The history of the water supply of Chelmsford for the past ten or twelve years was sketched by Alderman F. Whitmore, the Chairman of the Committee. He said if the present scheme were carried out, he believed they would get 15,000 gallons per hour, or, in a working day of 16 hours, 240,000 gallons. They had from the Burgess well 20,000 gallons, and from Admiral's Park 70,000 gallons; giving a total of 330,000 gallons. Deducting 3000 gallons for trade purposes, they would have 23 gallons per head of the population. He proposed the adoption of the Committee's report. Alderman J. G. Bond seconded the motion. Mr. G. Osborne asked whether the £8100 would be sufficient to put the scheme in a satisfactory condition. Alderman Whitmore replied that the cost of the new reservoir and that of the rising-main were not included in the £8100; but the Committee did not recommend the adoption of the whole of the scheme. The Mayor (Alderman F. Chancellor) said it was quite clear that if they proceeded with the expenditure of £8100, they would have to go on with the new reservoir, which would cost £3000. They had already entered into a bargain to purchase land at Long Stomps for £300. Practically £14,000 was the expenditure they would have to face if they proceeded with the recommendations. Ought they not to be thoroughly well satisfied that there was a great probability of obtaining the water they sought now? He could not hold up his hand for the scheme; his real reason being that they had not now, and would not have, the quantity of water they required for such a large expenditure. They ought to have 500,000 gallons a day at their command. Mr. Griffith said he was sure 15,000 gallons an hour could be safely relied upon from the new bore; and, if necessary, they could pump

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000
PERNAMBUCO (Brazil)	125,000
MALTON	150,000
DULUTH, MINN. (Second Contract)	300,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.) 1,000,000 Cub. Ft
GRAVESEND, 300,000 C. Ft. BROCKVILLE (ONT.) 250,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft.

24 hours a day, and get 360,000 gallons a day. Alderman G. W. Taylor wanted to know what they were going to do if they did not proceed with this scheme. Dr. Thresh—perhaps the best authority they had on the water question in Essex—had assured him that the result of the boring was satisfactory; and the Doctor was perfectly confident the water came from the chalk. The Committee's report was adopted by ten votes to three; and Mr. Griffith was instructed to prepare plans.

THE ASSESSMENT OF COLLIERIES.

At the Quarter Sessions for the County of Derby last Wednesday, the adjourned appeals of the various Colliery Companies in the Chesterfield Union came on for hearing. At the April Sessions, the appeals of Messrs. J. and G. Wells, Limited, and the Staveley Silkstone Colliery Company were disposed of as the result of a settlement arrived at between the parties by which the assessments were reduced by about one-third. The remaining appeals by nine Companies against the increased assessments placed upon 27 collieries in the rates made in April and October last were respited. Negotiations subsequently took place with a view to the settlement of these cases; but a definite agreement with regard to all the appeals was only arrived at on the morning of the trial. Upon the appeals being called on, it was announced that a settlement had been agreed to upon the following terms, being a reduction of about 35 per cent. from the figures that were the subject of the appeals:—

Company.	Assessment Appealed Against.			Terms of Settlement.	
	Gross.	Net.		Gross.	Net.
Blackwall Colliery	£4,364	£3,273	..	£2,838	£2,128
Clay Cross (aggregate figures)	23,020	17,271	..	14,967	11,227
Grassmoor	21,848	16,386	..	14,201	10,654
Hardwick	2,469	1,853	..	1,605	1,206
Staveley Coal and Iron . .	36,608	27,459	..	22,485	16,866
Bolsover	23,077	17,308	..	15,000	11,250
Sheepbridge	5,554	4,167	..	3,610	2,714
Sheffield Coal	3,861	2,897	..	2,509	1,884
G. H. Wells	168	126	..	109	82
Totals . . .	£120,869	£90,740	..	£77,324	£58,011

The assessments were therefore reduced by more than one-third, and the reductions will apply to the appeals against both rates. The Assessment Committee agreed to pay the appellants' costs in all cases. Mr. Edward Boyle, K.C., and Mr. J. H. Etherington Smith appeared for the appellants, whose witnesses included Mr. G. Humphreys-Davies (London), Mr. I. Treharne Rees (Cardiff), and Mr. C. E. Rhodes (Rotherham). Mr. Appleton appeared for the Assessment Committee of the Chesterfield Union; Mr. Noble for the Overseers of the various parishes; and Mr. Cross, of Manchester, was retained as a witness for the respondents. We are informed that these cases are only one group of a series of appeals in various parts of the country, and that in the South Wales coalfields alone the Machinery Users' Association are assisting the colliery owners to resist assessments amounting to a sum of upwards of half-a-million of annual value.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Glasgow Corporation Gas Committee on Thursday entered into contracts for about 600,000 tons of coal to be used in the gas-works during the forthcoming year. For the whole year's supply, from 150,000 to 200,000 tons are still to be bought. The larger portion of the coal purchased was splint, and it, along with ells, was taken in lots of from 5000 to 30,000 tons. The bulk of the splint was purchased at 9s. per ton and a little under; but for some classes of splints and ells, 9s. 2d. to 9s. 3d. was paid. All the coal is quoted for delivery at the works. The prices represent a reduction of from 6d. to 9d. per ton upon the prices paid last year. About the usual quantity of Cambuslang main coal was taken. With regard to cannel, between 90,000 and 100,000 tons of firsts, seconds, and thirds were contracted for at prices from 2s. to 5s. lower than a year ago. A quantity of coking coal was also placed, in lots of from 20,000 to 30,000 tons; as well as about 10,000 of Fifeshire shales. With this large order out of the way, the coal market will be more free for the general buyer. These prices are probably the lowest that will be attained this season.

The Hamilton Town Council this week had the balance-sheet of the gas undertaking for the past year before them, and they resolved that the profit for the year should be placed to depreciation. Having considered the estimates of the Manager (Mr. J. Ballantyne) for the current year, it was resolved to retain the price of gas at 2s. 6d. per 1000 cubic feet. It was reported that unaccounted-for gas had been reduced from 15·62 to 11·33 per cent. Some conversation took place about the borrowing powers of the Gas Committee under the Provisional Order which the Council obtained last year. The total sum authorized to be borrowed was £80,000; and of this amount it seems that the Electric Lighting Committee claim about half. The discussion was unintelligible except to those who are cognizant of more details than have been made public.

The Edinburgh and Leith Gas Commissioners met on Monday, with Provost Mackie, of Leith, in the chair. Mr. D. Purves, the Convener of the Works Committee, reported that during the year there was an increased output of 54,899,000 cubic feet of gas, compared with the preceding year. They expected, he said, to have steam turned on at Granton that week, and to have everything under test, and that they would be able to make gas there during the next month or six weeks.

Wright's "EUREKA" Gas Grillers

New Patented design, The "TUDOR,"

AUTOMATIC IN ACTION.

One Movement of

One Hand!

One Movement draws out Shelf with Tray, and opens Doors.

One Movement returns Shelf, and closes Doors.

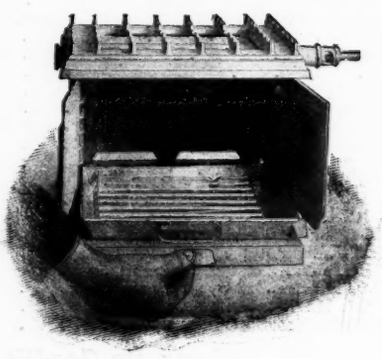
Powerful Heat-Deflector Plates, can be replaced instantly without Tools.

All the advantages of a fall-down Door, without the danger of breakage.

No need to hold the Tray, while drawn out for basting.

Shelf does not project, when not in use.

Shelf does not come out altogether.



DESCRIPTIVE LEAFLETS CAN BE HAD FOR DISTRIBUTION.

The Treasurer (Mr. John S. Gibb) laid on the table a copy of the annual accounts of the Commissioners, a summary of which was published in the "JOURNAL" last week (p. 101), and they were remitted to the Finance Committee; the Chairman remarking that the whole was very satisfactory. The Commissioners resolved to join the Association of Sulphate Manufacturers. The minutes of the Works Committee contained a report of the Sub-Committee appointed to inquire and report whether the statement by Mr. Kelly, "that he personally knew it to be a fact that, whenever the Corporation Analyst was to visit the Leith Gas-Works, there was a special endeavour made to keep up the quality of the gas to be tested, by the use only of the best cannel coal, from 2 to 5.30 of the afternoon of the day on which the tests were to be made," had any foundation, either in connection with the Leith or the Edinburgh Gas-Works. The Sub-Committee had a meeting on the 3rd of March. On the 5th of May they had another meeting; and on the 26th of May they had a third meeting, at which it was resolved to report that, having had an interview with Mr. Walker, the Manager of the Leith works, they find that the statement made by Mr. Kelly as to the practice of using a superior quality of coal at the Leith works prior to the periodic visit of the Analyst is substantially correct, and which practice is alleged to have been in operation previous to Mr. Walker's appointment, but unknown to Mr. Herring. Mr. Kelly dissented, and protested against the exoneration of Mr. Herring. The Sub-Committee recommended that instructions be at once given to Mr. Walker to discontinue this irregularity, and, further, to see that in future no special mixture of coal be used in anticipation of the Analyst's visits. Councillor W. F. Stewart moved that the Committee should approve thereof, and Councillor Douglas seconded. Mr. Kelly moved disapproval thereof so far as containing exoneration of Mr. Herring, and Mr. Manclark seconded. In the result, by fourteen votes recorded for the motion to two for the amendment, the Committee resolved to recommend the Commissioners to adopt the report as amended. Messrs. Kelly and Manclark dissented and protested. Bailie Waterston declined to vote, as having been one of the Sub-Committee; and Provost Mackie was not present at the division. The Commissioners adopted this minute without remark. Regarding this subject, I may say that Mr. Kelly was at one time an employee in the Leith Gas-Works, and it was therefore impossible to controvert his statements. That such a practice should have crept in is much to be regretted; but it is a great satisfaction to know that it was not done with the knowledge and sanction of the head of the department.

The "Dundee Advertiser" of yesterday promises further revelations with reference to the condition of the Dundee Gas-Works. It states that "during the past few weeks a thorough examination and overhaul of the plant at the works has been made under the direction of the Convener. The result of such inquiries will come as an unpleasant surprise to many members of the Town Council, and to the general body of the ratepayers. Allowing for the natural wear and tear incidental to, and always great in, this part of gas-making plant, the deterioration which is manifest far exceeds the most pessimistic expectations. It seems that no fewer than 560 retorts will require to be repaired or renewed. The estimate for the whole of the current year for such repairs stands at £2500. The cost of the work now on hand will, it is confidently stated, amount to between £4000 and £5000. Already some sixty retorts have been reset and repaired. In the case of these, 'baffles' (for ensuring a more equal distribution of heat) have been constructed. The results, judging from the quality of the coke extracted from these retorts, in which, under former conditions, carbonization was very incomplete, are highly satisfactory; and it is expected that when more accurate data are available, such will fully bear out this favourable impression. In the Dundee Gas-Works, the retorts are not arranged in uniform fashion. A proportion is disposed of in a set or series of eight retorts; the others are arranged in series of twelve. The 'twelves,' which are being dealt with, are in the worst condition. Many of the retorts are in parts burned out; while the surrounding brickwork is fused and cracked. These defects, though in less degree, also exist in the case of the 'eights.' The work is being pushed on with all despatch, and it is hoped that it will be completed before the advent of the dark autumn nights." It must be matter of regret to find the retort-bench in such a condition; but is it good policy to push on the work of repair in the meantime? The Corporation are in the process of electing a new Manager. Is he to have no say as to the construction of the ovens he is to work? Or is he, when he enters upon office, to find works which may not be to his mind, but which he will be obliged to accept and do the best he can with—probably leading again to disappointment? Has there not been enough already of the practice of requiring the Corporation Gas Manager in Dundee to work to instructions, instead of allowing him to give the instructions?

The Helensburgh Town Council last Saturday considered the accounts of the Corporation Gas Department for the year—the third since the transfer. Bailie Bryden stated that there had been expended on the purchase and reconstruction of the gas-works close upon £44,000. Of this sum, £4000 had been paid out of profits; and of £40,000 borrowed from the Glasgow Savings Bank, £1000 had been repaid—making the indebtedness upon the undertaking now £39,000. During the year, the receipts amounted to £11,399, or £173 in excess of the income for the previous year. The expenditure amounted to £8078; and the balance of profit was £8311. The increase was largely due to the excellent management of Mr. W. Blair, the Manager. The estimates for the current year showed an expected income of £10,034, and an expenditure of £9716. The Council adopted the accounts, and resolved to reduce the price of gas from 4s. 7d. to 4s. 2d. per 1000 cubic feet, and to 3s. 9d. for gas used in cookers, fires, and engines. Mr. Blair's salary was advanced by £20 a year.

The Gas Committee of the Peebles Town Council have agreed to recommend that the price of gas be reduced by 5d. per 1000 cubic feet—making it 3s. 4d. for lighting and 2s. 11d. for other purposes. This will make a reduction of 10d. for lighting and 1s. 3d. per 1000 cubic feet for other purposes which has been made since the Corporation

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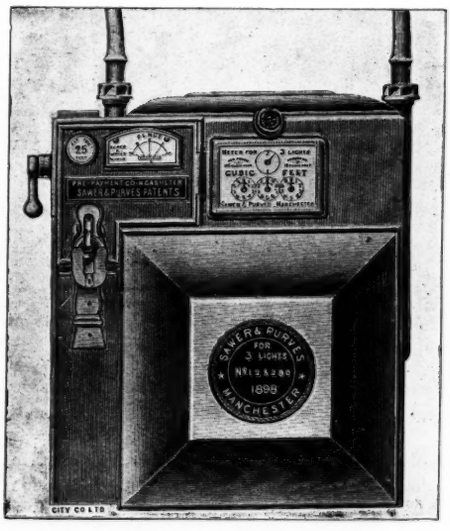

PREPAYMENT METER

FOREMOST EVER SINCE.

SAWER & PURVES,
MANCHESTER.

acquired the gas-works undertaking. The saving to consumers is about £1000 a year.

The Denny Town Council have reduced the price of gas from 4s. 10d. to 4s. 7½d. per 1000 cubic feet for lighting, and to 4s. 2½d. for other purposes.

Sheriff Jameson has to-day issued his award in the matter of the wages of coal miners, with regard to which he heard evidence in Glasgow for two days this week. The coalmasters asked a reduction of 12½ per cent. upon the wages. This meant a daily wage of 5s. 6d. instead of 6s. The Sheriff has granted a reduction of 6¼ per cent., which will make the men's wages 5s. 9d. per day. Calculated upon the ton of coal, the reduction is very small; but it may lead the way to other reductions. There is no period fixed for the duration of the new rate of wages.

The Cupar Gas Company had a balance of profit for the past year of £912. They have paid a dividend of 5 per cent. on the preference stock, 30s. per share on the ordinary stock, have allowed £200 for depreciation, and have carried forward £104. At the meeting of the shareholders, it was stated that the dividend upon the ordinary stock used to be at the rate of 40s. per share; but it was less this year on account of the high price of coal. It was also mentioned, with regret, that they were about to lose their largest customer—the Fife and Kinross Lunacy Board, who were adopting the electric light in the county asylum. The Company are doing a good and growing business through prepayment meters. They have carried forward £104, as compared with £3 17s. last year; and they have been able to reduce the price of gas from 4s. 4½d. to 4s. 2d. per 1000 cubic feet.

The Saltcoats Gas Company, Limited, of which Mr. J. Napier Myers is Manager, have just completed a very successful year, and have declared a dividend of 5 per cent. The make of gas shows an increase of 1,206,000 cubic feet; and the number of consumers have augmented by 45—making 2063 in all. New purifiers have been erected at the works; and new mains are being laid to replace older ones. The leakage has been reduced to 5·31 per cent.

The annual general meeting of the Brechin Gas Company was held a few days ago in the Masonic Hall—Mr. James Guthrie, the Chairman, presiding. The Directors' reports and the statement of accounts were submitted, and considered very satisfactory. The Chairman, in moving the adoption of the reports, remarked that on the 1st of February last the Directors reduced the price of gas for engines and cooking-stoves by 6d. per 1000 cubic feet. Since last year, partly as a result of this concession, there had been an additional 100 stoves and 190 slot meters fixed in the town. He also called attention to a new feature—viz., the fixing of boiling-rings and slot meters free of cost to new consumers. This had, he said, been a decided success. The slot-meter installation in the town now amounted to considerably over 300. Notwithstanding the competition of the electric light and cheap oil, the revenue for the past year has been almost the same as for the preceeding twelve months for general lighting; the deficit being only about £100 less for street lighting than in former years. Even with the partial loss of this lighting, the consumption for the past twelve months was more than it was two years ago. A dividend at the rate of 25s. per share was declared—the same as last year. It was agreed to reduce the price of gas by 3d. per 1000 cubic feet, and to fix it for the current year at 4s. 9d. for lighting purposes, and 4s. 3d. for cooking and motive power. The meeting voted the Manager (Mr. Allan Reid) an advance of salary of £20 per annum, and complimented him on the satisfactory working in the past year.

The Crieff Gas Light Company have paid a dividend at the rate of 5 per cent., with a bonus equal to another 5 per cent., for the past year, and have continued the price of gas at 4s. 2d. per 1000 cubic feet. The Alyth Gas Light Company have paid a dividend at the rate of 3 per cent. The Annan Gas Company had a net revenue last year of £697. The dividend recommended by the Directors is 5 per cent.; and they also recommend that £200 be added to the contingent and insurance fund, raising it to £1000. A sum of £135 is to be carried forward. The Directors of the Selkirk Gas Company reported to the shareholders this week that the manufacture of gas during the past year amounted to 28,200,000 cubic feet—an increase of 3 million cubic feet over the preceding year. The profit amounted to £834. The Baillieston Gas Company have reduced the price of gas from 4s. 2d. to 3s. 9d. per 1000 cubic feet. The Jedburgh Gas Company have paid a dividend of 5 per cent. They have also written off £100 for depreciation, and have reduced the price of gas 5d. per 1000 cubic feet, making it now 5s. 10d., with a rebate of 5 per cent. to consumers of 70,000 cubic feet and upwards.

The Town Council of Arbroath are slow to learn the lesson that it is vain for them to think of supplying the inhabitants of the town with water from underground. They are only able to get about 12 gallons per head per day, which is altogether inadequate. They have received advice more than once, to the effect that they must look to a gravitation scheme for relief. Yet they are still prospecting for underground water. A bore is being put down, and another is intended to follow, near the existing works. I see that objection is taken to the attempt to find water where it must already be all appropriated, which is quite a reasonable objection.

The Kelso Town Council have difficulty in getting a sufficient water supply for the town. After making inquiries in various quarters, they have turned their eyes towards the River Tweed, which flows past; but the proposal is not to take the water of the river direct. A bore has been sunk 100 feet in one of the islands in the river, and the water obtained from it was sent to Dr. Thresh, of London, for analysis. This gentleman's report upon the sample was favourable. It is probable that the Council will go on with this scheme.

Messrs. R. Dempster and Sons, Limited, of Elland, have secured the order from the Bathgate Gas Company for four purifiers, 14 ft. by 10 ft. by 5 ft. deep, on Green's system, complete with Weck's centre-valve and connections.

England's

Kitchener

home
from the
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Richmond's

Kitchener

is at
the front
in every
home.

R LTD CO

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 12.

Sulphate of Ammonia.

The market has been somewhat irregular—fairly steady at east coast ports, but weak on the west coast, as low as £12 2s. 6d. per ton having been accepted at Glasgow. The closing quotations are £12 5s. per ton. f.o.b. Hull and Liverpool, and £12 6s. 3d. to £12 7s. 6d. per ton f.o.b. Leith. Consumers everywhere are holding aloof, being able to buy ahead at a substantial discount on prompt prices; so that the market is mainly in the hands of middlemen who have shorts to cover. On the other hand, production is at its minimum; but makers, finding prices easing off, are anxious to market their output as it becomes available. There is nothing to report in the forward position; makers displaying no anxiety to sell ahead, while buyers think that they will do better by waiting.

Nitrate of Soda.

This article is quiet at 8s. 6d. per cwt. for ordinary, and 8s. 9d. for refined quality, on spot. The Nitrate of Soda Committee have now definitely fixed 30½ million quintals as the maximum to be shipped April, 1902—March, 1903. Probably this maximum will not be reached, but it is impossible at present to estimate what the shortage may be, and, in the meantime, the forward market is flat.

LONDON, *July* 12.

Tar Products.

The markets continue dull; and there is really very little fresh to report. There is no business doing in any of the articles, with the exception of pitch, the price of which continues very firm; but, of course, the demand is only for local consumption. It is, however, reported that a large business has been done for July-December, 1903, with consumers in South Wales, while there are rumours of contracts having been made in London makes all over 1904. In benzol, there is no business whatever to report; and it is difficult to fix the price which would induce consumers to purchase. Crude carbolic remains in the same position. Some quantity of 60's was placed for prompt delivery at 1s. 9¾d.; but consumers offer only 1s. 9d. for August-October. As regards crystals, there is a slight business doing in 39-40's at 5½d. per lb.; but, as a rule, buyers hold off the market. There is very little creosote offering in London, as the demand for export keeps fairly good; but in the Midlands and North, there is a decided dulness, and prices are, if anything, a little easier, especially for early delivery. During the last week or two, some extensive inquiries have come into the market from large railway companies; and this may make matters firmer in the future. As regards solvent, business is reported in a good London make for delivery over the next twelve months; but this was most probably for home consumption. Toluol and anthracene remain unchanged. There is nothing fresh to report in either of the articles.

The average values during the week were: Tar, 17s. to 22s. Pitch, London, 50s. to 53s.; east coast, 47s. 6d. to 48s.; west coast, 41s. to 41s. 6d. Benzol, 90 per cent., 8d.; 50-90 per cent., 7d. Toluol, 8d. Crude naphtha, 2¾d.; solvent naphtha, 9d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1¼d.; North, 1d. Heavy oils, 1¼d. Carbolic acid, 60 per cent., 1s. 9d. Naphthalene, 35s. to 50s. Salts, 21s. to 22s. 6d. Anthracene, "A," 1½d. to 1¾d.; "B," 1d. nominal.

Sulphate of Ammonia.

The market is still quiet; and there is little or no demand for either prompt or forward delivery. The position of Beckton is unchanged. The Gaslight and Coke Company would still accept £12 2s. 6d. for September, and £11 15s. for October-March, although their nominal quotation is about 2s. 6d. over these prices. In Liverpool, the market is very flat, A small business is reported for prompt shipment at £12 3s. 9d, to £12 5s. In Hull, there are now sellers at £12 2s. 6d. to £12 3s. 9d.; but buyers seem indifferent as to supplies from this port. In Leith, there is really no business doing; and although there is not much offering, consumers do not appear at all anxious to purchase. Business was reported towards the end of the week at £12 5s. for shipment during July; but the transactions are of very little importance, and the actual value is rather uncertain. The market closes decidedly quiet, with an absence of inquiry for either prompt or forward delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The lessened demand for house-fire consumption is bringing about an accumulation of stocks in the better and medium qualities of round coal, and also necessitating a restriction of the output; very few Lancashire collieries now running more than about four days per week. There is, however, no surplus of coal offering on the market; and prices have been steadily maintained at late rates. There is some competition here and there from outside districts; but this is of no great consequence, and it is only where regular trade is being endangered that collieries at all entertain any concession to secure business. At the pit, quoted prices remain about 13s. 6d. to 14s. per ton for best Wigan Arley, 12s. to 12s. 6d. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. In the lower descriptions of round coal, suitable for gas-making purposes, business is moving on steadily in the settlement of contracts, with prices much the same as those which have been quoted recently. At the pit, rates may be given at about 7s. 6d. to 8s. per ton for good Arley slack suitable for gas making, from 8s. 3d. upwards, according to quality, for gas nuts, 9s. to 9s. 6d. for good screened Wigan four-feet gas coals, and 10s. to 10s. 3d. for screened

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Ar'ey gas coals. For steam and forge qualities, the demand is moderate; but there is no very appreciable giving way in prices, although these are not quite so strong as they were a short time back. At the pit, good steam and forge coals for inland sales are scarcely quoted under 8s. 6d. to 9s. per ton; and very little concession on these figures is obtainable on forward contracts. For shipment, there is some cutting to clear off promptly surplus output; and as low as 9s. 6d. to 9s. 9d. per ton delivered at the Mersey ports is being taken, with 10s. to 10s. 3d quoted for good qualities of steam coal. The better classes of engine fuel are steady at 6s. 6d. to 7s. per ton at the pit. Common Lancashire slack averages from 4s. 6d. to 5s per ton upwards, with inferior sorts to be bought in Derbyshire as low as 2s. to 2s. 6d. per ton at the pit, and slack from Yorkshire also competing in the market.

Northern Coal Trade.

There has been a fuller production, and the requirements of the trade are now met from day to day; so that prices are on the whole rather easier. The demand, however, is very brisk for best steam coals; and the price for this class is steady at from 11s. 3d. to 11s. 6d. per ton f.o.b. for best Northumbrian steam. Second-class coals are quiet at from 9s. 6d. to 10s., and steam smalls are about 5s.; the supply of these kinds being now larger and adequate to all requirements. Indeed, in a few cases the collieries have not had quite enough trade for a full output. In the gas coal trade, the demand shows a slight increase; but it is still small for the producing capacity. The range of prices is from 8s. 6d. to 9s. 3d. per ton f.o.b., according to the quality; and some contracts are expected to be settled on what is about a medium price. Gas coke is very irregular in price, from 10s. to 11s. being the f.o.b. quotation. The production has been low; but it is now beginning to increase.

Scotch Coal Trade.

There is no change to record. Business is fairly active, but prices cannot be said to have altered. Sheriff Jameson, as Oversman, has decreed that miners' wages are to be reduced 6¼ per cent., which will make the market easier. The prices quoted are: Main 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow, ell 9s. 6d. to 10s. 3d., and splint 9s. 3d. to 9s. 6d. The shipments for the week were 218,431 tons—a decrease of 20,346 tons upon the preceding week, and of 20,116 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,167,960 tons, as compared with 4,835,004 tons—an increase of 332,956 tons upon the same period of last year.

The town authorities of Neuhäusel, in Hungary, have granted to Herr Keller, the Director of the Central Gas and Electrical Company of Budapest, a contract for the erection of a water-gas plant on the Strache system. The construction of the plant has been entrusted to the firm of Kurz, Rietschel, and Henneberg, of Vienna; and it is to be in working order before the beginning of the winter.

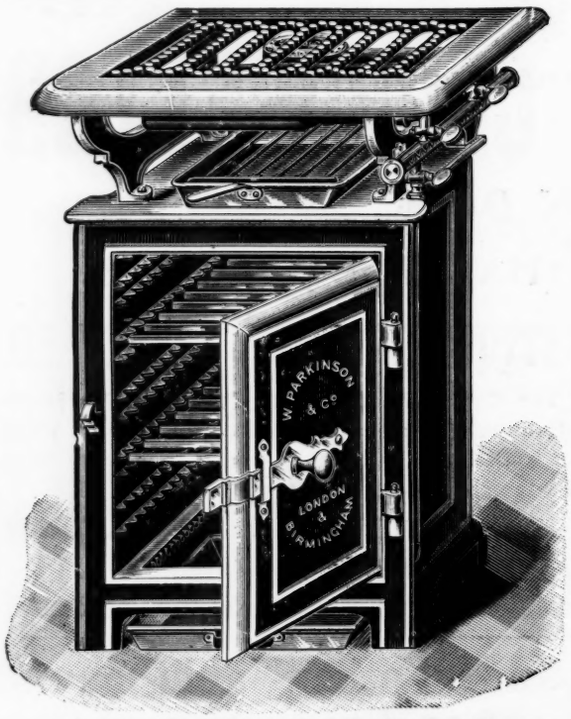
Reductions in Price.—The Leominster Gas Company, Limited, have decided to reduce the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet. The Hornsey Gas Company announce that from the date of taking the meter-indices for the Midsummer quarter, the price of gas will be reduced 1d. per 1000 cubic feet (from 3s. to 2s. 11d.).

Ystradfellte Water Bill.—The powers sought by the Neath Rural District Council in this Bill, as introduced, were confined to taking water from the River Tringarth, constructing works, and supplying water. They have now been extended by a clause (to the insertion of which there was no opposition), giving the Council authority to purchase the gas and water works of Messrs. Wright, Butler, and Co.

Berkhamsted Gas Company.—The annual meeting of this Company was held on the 28th ult.—Mr. G. Daniels in the chair. The accounts presented showed that the year's working had resulted in a profit of £1718; and the Directors recommended the declaration of a dividend of 10 per cent. on the original and of 7 per cent. on the additional shares. This was unanimously agreed to. In acknowledging a vote of thanks to the Officers, the Engineer and Secretary (Mr. A. F. Phillips, M.Inst.C.E.) remarked that he was connected with a number of gas and water companies, but at no place did they do business so amicably as at Berkhamsted.

Norwich Water-Works Company.—At the recent half-yearly general meeting of the City of Norwich Water-Works Company—Mr. A. R. Chamberlain presiding—the Directors reported that, after payment of the working expenses, debenture interest, and dividend on preference shares, and including the balance from the previous half year, there remained a sufficient sum to pay a dividend on the ordinary shares at the rate of 6 per cent. per annum (deducting income-tax); leaving the sum of £10,985 10s. 6d. to be carried forward. They added that the works continued to be maintained in their usual complete order and efficiency. It was resolved that the report be received and adopted. The thanks of the meeting were given to the Chairman and Directors for their valuable services.

Dangers of Defective Gas-Brackets.—The Deputy City Coroner for Manchester (Mr. L. J. Aitken) held an inquiry last Wednesday into the circumstances attending the death of Georgina May Stebbing, three years of age, living at Charlton-upon-Medlock. On the previous Monday evening the child was put to bed with an elder one by the servant, who left the gas burning; but later in the evening she went into the room and turned out the light. The next morning a strong smell of gas was perceived, and on the mother entering the room where the two children were she found it was full of gas. The younger child was dead; and the other had to be taken to the Infirmary. A police constable deposed to the gas-bracket being in a very unsafe condition, and said he thought the curtains might have come in contact with the tap and turned it. The mother stated that she was aware that the tap turned round; but the servant said she thought she had shut off the gas securely. The Jury returned a verdict of "Accidental death."



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More Coal in the Midlands.—There was much rejoicing at Rowley, in Staffordshire, a few days ago, in consequence of an important discovery of thick coal beyond what is known as the South Staffordshire Boundary Fault. About £20,000 had been expended in boring for coal, and it appears that a seam 30 feet thick has now been reached, which is believed to extend over no less than 45 acres.

Gas Coal in Westphalia.—The gas coal seams of the Westphalian coalfields are from 30 to 38 in number, and of a workable thickness of 109 feet, and a total depth of strata of 3300 feet. The bituminous and semi-bituminous deposits attain a depth of 2100 feet, and contain from 31 to 39 seams, with a workable thickness of 88 feet. The non-bituminous deposits are 3300 feet in depth, and contain from 15 to 19 seams, with a workable thickness of 34 feet. The total depth of the coal formation is stated to be 8700 feet, and the total thickness of workable coal 230 feet. The quantity of coal down to a depth of 4650 feet is computed at 54,000 million tons. The deepest pits are just now 2775 feet.

The Lighting of Okehampton.—The negotiations which have been in progress for some time between the Okehampton Town Council and the Gas Company respecting the renewal of the contract for lighting the streets have ended in disagreement. One request of the Corporation was for a rebate of 10 per cent. on quarterly payment. This the Company declined to allow; but they offered instead to take off 1d. per 1000 cubic feet if the account were paid within one month of quarter-day. The Company wanted an agreement for five years. This the Corporation refused to grant; and as the differences could not be adjusted, the Council declined to sign the agreement. The old contract terminated July 1. A Committee was appointed to make arrangements for the lighting of the town. There is in Okehampton a small electric lighting plant worked by water power; and it is possible that arrangements may be made for lighting the town by electricity.

The Position of Mr. Meunier at Stockport.—At the meeting of the Gas and Electricity Committee of the Stockport Corporation on the 12th ult., a letter was read from the Engineer (Mr. S. Meunier) stating that several important appointments were likely to be open in the near future, and as he was within two or three years of the maximum age generally fixed for them, he respectfully asked the Committee as to the prospects of his position before deciding what course he should adopt with regard to them. The letter was referred to a Sub-Committee, who reported that they were unanimously of the opinion that it would be to the advantage of the department to offer Mr. Meunier an increase of £50 each year for four years, in order to bring his remuneration up to the average of similar undertakings. The question was thoroughly discussed; and it was eventually resolved, with two dissentients, that the report should be adopted. The minutes of the Committee came before the Council at their last monthly meeting, and, after a long discussion, they were adopted with the exception of the one relating to the Engineer's salary.

The Langport, Huish, and Curry Rivel Gas Company, Limited, has been registered with a capital of £10,000, in £1 shares, 7000 of which are preference, to take over the business of the Langport Gas Company, Limited (registered in 1861), to produce and supply gas or other illuminants in Langport, Huish, and Curry Rivel, in Somersetshire, and to deal in residual products of gas, oil, and other materials and substances.

Daventry Water Supply.—An inquiry on behalf of the Local Government Board was held last week by Colonel A. G. Durnford, regarding the application of the Town Council to borrow £7500 for purposes of water supply. The proposal is to bring the water from Dodford Village, where an abundant supply has been located. The details were explained by Mr. John Eunson, the Engineer for the scheme, and Mr. J. B. Williams, the Borough Surveyor. There was no opposition to the scheme as a whole; but certain modifications were suggested by a member of the Town Council, who contended that a saving in cost might be effected by altering the route taken by the pipes to and from the reservoir.

Batley Gas and Water Supply.—The accounts of the Batley Corporation for the year ended the 31st of March last show that the finances of the borough are in a healthy condition; the income for the twelve months having exceeded the expenditure by £6777. There is a surplus on water-works account of £2467, and on gas-works account of £2450. The surplus assets of the town amount to £159,570, in addition to £179,771 in cash. The turnover for the year was £140,000, including upwards of £16,000 paid in interest at an average rate of £3 3s. 3½d. per cent. Considering the difficulties in connection with gas management which have been experienced of late, a net profit on the gas-works of £2450 is regarded as highly satisfactory. The consumption through penny-in-the-slot meters increases year by year, and there is now an income of nearly £700 a year from this source.

Wath-upon-Dearne Water Supply.—A Local Government Board inquiry was held last Thursday at Wath-upon-Dearne, with reference to an application by the Urban District Council for permission to borrow £9000 for purposes of water supply. It was stated that the Council, in order to keep up the supply of water, were bound to pay the Dearne Valley Water Company an increased price to pump the water into their district; to erect their own pumping-station at the place where they received the water from the Dearne Valley Company and pump it into their own district; or to obtain another source of supply. The Council had decided to adopt the last course. The Derwent Valley Company, in consideration of £3000 paid by the Council, released them from their area of supply; and they were now at liberty to obtain a supply from any source they chose. Evidence was given that the Wath Main Company pumped 119,341 gallons of water per day from their colliery; and it did not make the slightest impression on their well, which was near the site intended for the pumping-station the Council proposed to erect. There was no opposition.

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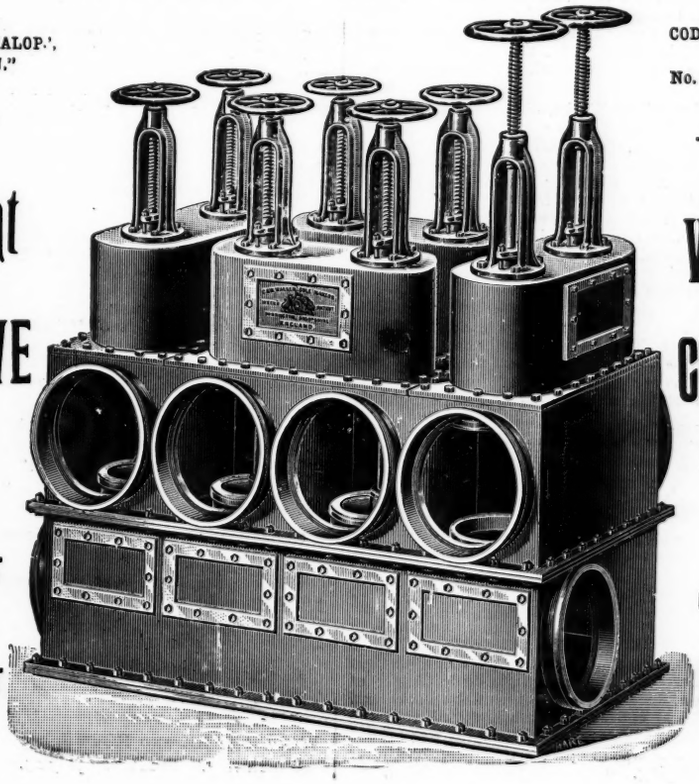

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Torquay Water Supply.—The Corporation of Torquay intend to apply for further parliamentary powers in connection with the water supply of the town. The matter was referred to at a recent meeting of the Town Council, when the Water Committee presented a report recommending that the necessary steps should be taken with the view to the promotion of a Bill next session, and mentioning among the objects for which power is to be sought the impounding of the Trenchford or Beadon Brook and a stream named the Kennick, the purchase of land, and the construction of water-works generally. The report was adopted.

Gas-Works Extensions at Burton.—The principal item of business at the meeting of the Burton-on-Trent Town Council last Wednesday was a report by Sir George Livesey on the proposed extension of the gas-works. Sir George advised that the work be carried out; the estimated cost being £53,000. The Committee endorsed the report, but suggested that only a section be executed immediately, at an expenditure of £36,000. This included a new retort-house and condensers. A discussion arose as to the desirability of members being provided with copies of the report before finally deciding; and, pending the distribution of these, the consideration of the matter was deferred.

Crowborough and District Gas Company.—Very satisfactory progress has been made by the Crowborough Gas Company during the past twelve months. The revenue account shows an increase of £377; the gross receipts being £2137, as compared with £1760 last year. During the year, the Company have carried out certain extensions, all of which have proved profitable. They contemplated shortly going to Rotherfield, as well as to the Beacon, for the purpose of supplying a large building estate which is now being developed. From these extensions a considerable increase of revenue is expected to be obtained, which the present plant will be well able to cope with. The Company are not yet paying a dividend; but it is anticipated that, if affairs continue in the same satisfactory position as at present, a return will be made to the shareholders next year.

Burley-in-Wharfedale Water-Works.—At the last meeting of the Burley-in-Wharfedale Urban District Council, the Engineer for the new water-works (Mr. M. Paterson, of Bradford), reported that the dam was within 9 feet of the top water-level, and that 40,000 cubic yards of earthwork had been completed, leaving less than 10,000 cubic yards to be carried out. Probably more than nine-tenths of this had come out of the reservoir site within the water-line, in addition to most of the puddle, the rubble, pitching, and the beaching. The pitching is almost entirely obtained from surface drift boulders of millstone grit—naturally the hardest and most durable specimens of that stone. These were split into massive blocks, and keyed up with smaller material. It is expected that the whole of the earthwork and puddle will be completed by the end of October, and the works by the close of the year.

Cromer Water Company.—The report presented at the recent meeting of the Cromer Water Company stated that the revenue for the year ending March 31 amounted to £3756, or an increase of £306 over the previous twelve months; while the expenditure was £1220, or £43 more. The receipts for the year, added to the balance brought forward and bank interest, brought the total of the profit and loss account to £2892; and after the payment of debenture interest, and making a transfer to the capital account, there remained a balance of £2535. The payment of the interim dividends in December absorbed the sum of £800, leaving £1735 available for payment of dividends. The Directors recommended that dividends of 5 per cent. on the original shares and 3½ per cent. on the additional shares, less income-tax (making 10 and 7 per cent. respectively for the year), be declared. They also recommended that the dividend on the original shares for each of the past three years be made up to 10 per cent. per annum, less income-tax. The sum of £1665 would be required for the payment of these dividends, leaving £69 to be carried forward. The report was adopted.

Completion of the Merthyr Water-Works.—The Upper Neuadd reservoir of the Merthyr Tydfil Water-Works was opened last Thursday by Mr. Gwilym C. James, J.P., the Chairman of the Merthyr Urban District Council. The reservoir was constructed under the Merthyr Tydfil Water-Works Act, 1895, by Mr. G. F. Deacon, M.Inst.C.E., with Mr. G. F. Harvey, Assoc.M.Inst.C.E., the Engineer and Surveyor of the Council, as Resident Engineer. The works carried out consist mainly of a magnificent masonry dam, and the reservoir has been constructed to hold 350 million gallons of water; the surface area at the top water-level being 59 acres, and the drainage area 2018 acres. The length of the dam across the valley is 1622 feet. The contract portion of the work has been executed by Messrs. Holme and King, of Liverpool and London. The cost of the undertaking has been about £120,000. The Lower Neuadd reservoir is being repaired at a cost of about £16,000. The supply of water will not only be sufficient for the wants of the Merthyr parish, but will yield a surplus upon which other adjoining parishes will be able to draw, subject to an arrangement with the Merthyr Council.

Kingsbridge Water Supply.—An inquiry was held at Kingsbridge a few days since by Mr. E. A. Sandford Fawcett, one of the Local Government Board Inspectors, in regard to an application by the District Council for power to borrow £3100 for purposes of water supply. Mr. E. Windealt, who represented the Council, explained that this scheme was to supplement the present means of water supply. The land on which the works would be constructed was to be acquired on a lease for 500 years, at £45 per annum. The Council had previously contemplated the execution of works costing £10,000; but the present scheme was offered as an alternative. The other was dropped, as they felt they were not justified in incurring such a large expenditure. Mr. W. G. Ussher gave evidence as to the geological formation of the district, and said that the source of the water which it was proposed to use was deep seated, and there was little danger of pollution. Mr. T. W. Latham, the Surveyor, described the works, and Mr. W. H. Webb, the Medical Officer of Health, stated that the analyses of the water gave satisfactory results. Opposition was offered to the scheme by a ratepayer, who was of opinion that sufficient water could be obtained without pumping.

Suicide by Coal Gas.—An inquest was held at Westminster last Tuesday on Arthur John Clark, aged 55, a furniture dealer. The deceased, it appeared, had recently been greatly worried by the sanitary authorities, who required him to carry out drainage alterations on some leasehold property. Frederick Harrild, employed by the deceased, said that on the previous Sunday morning he knocked at the shop door without getting an answer. He effected an entrance, and found Clark lying on the couch and the place full of gas. He noticed that the deceased was holding in his right hand a flexible tube attached to a gas-jet—the end of the tube being close to his face, and the gas full on. A constable deposed to finding on the table a document in the nature of a will, dated the 5th inst., whereby deceased bequeathed all his property to his wife. Attached to it was a receipt for an insurance premium for £100 effected the same day. The Jury returned a verdict of "Suicide during temporary insanity."

WANTED, FOR SALE, AND CONTRACT ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

SITUATIONS VACANT.

ASSISTANT ENGINEER. Stockton-on-Tees (July 16).
COLLECTOR, &c. Aberavon (July 19).
ENGINEER and MANAGER. Dundee Gas Department (July 22).
GAS-FITTER. Aylesbury.
GAS-STOVE BUSINESS MANAGEMENT. Sharpe, Parker, & Co.
MAIN AND SERVICE LAYER. Wilmslow.
MANAGER. Newry Gas Department.
METER INSPECTOR. Grantham.
SECRETARY AND MANAGER. Denbigh Gas and Water Companies (July 18).
STOKER, Kenilworth.
STOKERS. Leatherhead.
SULPHATE MAKER. Wigan Gas Department.
TRAVELLER. Greenall's Meter Syndicate.
WORKING MANAGER. Mickleover and Etwall Gas Company.
WORKS SUPERINTENDENT. Wolverhampton (July 22).

PLANT, &c. (Second-Hand) FOR SALE.

CAST-IRON TANK. Williams, London.
CONDENSER (250,000 cubic feet). Redditch Gas-Works.
GAS-ENGINE. King, Sell, and Olding, London.
GASHOLDERS (various). Wright, London.
PUMP AND GAS-ENGINE. Stockport Water Department.
PURIFIERS. Mablethorpe Gas-works.
PURIFIERS and ENGINE and EXHAUSTER. Carr, Widnes.
PURIFIERS, SCRUBBER-WASHERS, GASHOLDERS, &c. Firth Blakeley Dewsbury.

PLANT (Second-Hand) WANTED.

PURIFIERS, CONDENSERS, and EXHAUSTER and ENGINES. Hill, Birmingham.

SALES OF STOCKS AND SHARES.

LANGPORT, HUISH, AND CURRY RIVEL GAS COMPANY, LIMITED. 5000 Cumulative 5 per Cent. Preference Shares (July 17).
RICHARDS, Mr. ALFRED—July 22: Hampton Court Gas Company, High Wycombe Gas Company, Pinner Gas Company, Southend Water Company, Walton-on-Thames and Weybridge Gas Company.
SOUTH METROPOLITAN GAS COMPANY. Tenders by Aug. 5.
WHITBY GAS COMPANY. Tenders by July 18.

STEAM-ENGINES.

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FARNWORTH AND KEARSLEY. One year's supply. Tenders by July 30.
HOLYHEAD. One Year's Supply. Tenders by July 17.
KENT WATER COMPANY. July 26.
NEWRY. 3000 to 3500 tons. Tenders by July 18.
ROTHERHAM. 3000 tons. Tenders by July 22.
SEDGLEY. 700 to 1000 tons. Tenders by July 23.
WARRINGTON. 35,000 tons.

GASHOLDERS.

BODMIN. Re-Sheeting Crown with Iron or Steel.
WEST DERBY GUARDIANS. Telescoping. Tenders by July 25.

GAS SUPPLY.

SCHAERBEEK (BELGIUM). Tenders by July 30.

METERS, COOKERS, &c.

CANTERBURY GAS AND WATER COMPANY. Tenders by July 26.

PURIFIERS AND GAS ENGINE AND EXHAUSTER.

WEST DERBY GUARDIANS. Tenders by July 25.

RAILWAY OIL-TANKS.

STAFFORD GAS DEPARTMENT. Tenders by July 22.

TAR.

CATERHAM. About 35,000 gallons. Tenders by Aug. 1.

TUBES AND FITTINGS.

CANTERBURY GAS AND WATER COMPANY. Tenders by July 26.

WATER-TANK AND ROOFS.

SMETHWICK. Tenders by July 25.

Southport Water Board.—In a paragraph on this subject which appeared in the "JOURNAL" on the 27th of May, it was stated that Mr. H. Rofe, M.Inst.C.E., had retired from the service of the Board as Manager. We learn that the gentleman who relinquished this position was Mr. S. J. Rofe; and that the Works Committee of the Board have appointed Mr. H. Rofe Consulting Engineer. He is to report as to the present position of the water supply, and what steps should be at once taken for increasing it and the storage capacity of the works.

Gas v. Electricity at Aberavon.—A special meeting of the General Purposes Committee of the Aberavon Town Council was held last Wednesday, to consider the advisability of proceeding further with the new gas-works scheme. The Town Clerk (Mr. M. Tennant) at once informed the meeting that, subject to the Local Government Board sanctioning the expenditure, the contracts had been let, and the Council were under an obligation to go on with the scheme. A long discussion followed; and the Gas Manager (Mr. A. J. Bond) made a full statement as to the position of the present works. He pointed out that it was absolutely essential to proceed with the new works, as the existing plant would be totally inadequate to meet the growing needs of the district. The question of electric lighting was also discussed. The Town Council have obtained an Order; and as the time-limit is rapidly running out, the Council have provisionally agreed with the South Wales Electric Power Company to purchase current in bulk at 2½d. per unit—the minimum number of units to be taken per annum being 15,000. In the result, it was decided to go forward with the new gas-works scheme.

Public Lighting of East Molesey.—At the last meeting of the East Molesey District Council, the Highway and Lighting Committee recommended that the tender of the Hampton Court Gas Company for the incandescent lighing of the district be accepted, and that it be referred to the Committee and the Clerk to prepare a contract for carrying it out. The Company's tender was to connect the lamps, provide the necessary piping, material, and labour, and fix the incandescent burners (removing the base of each lantern, and fixing one almost shadowless and suitable for the installation of a new burner), at 18s. 6d. each; providing and fixing a burner for 75-candle power, 9s.; do. for 100-candle power, 9s. 6d.; new lanterns, where required, 25s. each; lighting, and extinguishing burners, including cleaning and repairing lanterns, 75-candle power £3 8s. 6d. per annum; do., 100-candle power, £3 19s. 6d.; and for the outlying lamps, £4; the number of burning hours to be 3636 per annum. The Chairman (Mr. H. J. Robertson) remarked that, looking at the figures, the cost of the whole thing was a 2d. rate for the installation, and ½d. in each future rate for the maintenance. Mr. Alderton said the terms offered by the Company were the same as those charged in the surrounding district, and the tender appeared very favourable. They were getting their lighting on the very best terms. He moved the adoption of the report. Mr. Ridgway seconded the motion. Mr. Bliss remarked that, now the electric lighting scheme had gone, everybody seemed of opinion that the incandescent gas lighting was the best thing they could go in for. The motion was unanimously adopted, and the Council decided not to bind themselves in the contract for more than three years from the present time.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

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Telegrams: "GASKING, LONDON." Telephone: P.O. 1571 Central.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.
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HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.
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Twice as Rich as Bog Ore.
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IT is Effective, Simple, Shadowless, and Cheap.
An absolute necessity for Successful Lighting of Streets, Shops, Railway Premises, Factories, and Mills.
Made in sizes to suit all Makes and Patterns of Incandescent Gas-Burners.
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TO GAS AND WATER OFFICIALS.
COURT ROYAL CYCLES enable the rider to experience all the true delight and irresistible charm of a grand health-yielding pastime. These Cycles are now supplied ON SPECIAL TERMS to Gas and Water Officials.
Apply for Catalogues, Books of Testimonials, and Particulars of EASY TERMS of purchase, to the Makers, LLOYD COURTS & CO., COVENTRY; or to our LONDON AGENTS, Messrs. E. PADFIELD & CO., West India House, 96 and 98, Leadenhall Street, LONDON.

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Apply to W. SUTTON, Manager.

WANTED, an experienced Traveller. State Age, Salary, Experience, and References.
Apply, by letter, to the SECRETARY, Greenall's Positive Meter Syndicate, Ltd., 7, Greek Street, LEEDS.

TO GAS-FITTERS.

WANTED, an Improver, one used to House Fittings.
Apply, in Writing, to GEORGE LANE, Manager, Gas-Works, AYLESBURY.

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WANTED, two good Stokers, used to Shovel Charging, Regenerators, and Engine and Exhauster.
Apply, to the GAS-WORKS, LEATHERHEAD.

WANTED, at once, a steady Young Man as MAIN and SERVICE LAYER. STOVE and GAS FITTER. Willing to make himself generally useful.
Apply to WM. SEVERS, Gas-Works, Wilmslow, MANCHESTER.

WANTED, by the Grantham Gas Company, an active young Man as METER INSPECTOR. Wages 26s. per week. Normal hours, 8 a.m. to 5 p.m., and one week's Holiday per year.
Apply, stating Age, Experience, and References, to Mr. R. G. SHADBOLT, Gas-Works, GRANTHAM.

GENTLEMAN with connection wanted for established Gas-Stove Business. Must be qualified to take entire charge of Selling Arrangements, and also have an Oversight of Works, and be in a position to take a financial interest in the business.
Address GAS STOVES, care of Sharpe, Parker & Co., Solicitors, 12, New Court, Carey Street, LONDON, W.C.

DENBIGH GAS AND WATER COMPANIES.

WANTED, a Secretary and Manager. Must have a thorough knowledge of Gas Manufacture, the Distribution of Gas and Water, Secretarial Work, and Bookkeeping. Make of Gas: 12 Millions.
Salary £150 per annum.
Applications, with Particulars as to Age and Qualification, accompanied by *copies* of recent Testimonials, endorsed "Application Secretary and Manager," to be sent in by the 18th of July, addressed to the CHAIRMAN, Gas and Water Companies, DENBIGH.

MICKLEOVER AND ETWALL GASLIGHT AND COKE COMPANY, LIMITED.

WANTED, a Working Manager. Make about 10 million cubic feet. He must be experienced in the working of Regenerative Furnaces, Main and Service Laying, Meter and Stove Fixing. House on Premises, with Garden (Rent Free). Coal and Gas found.
Applications, giving full Particulars of Age, Experience, and Wages required, with *copies* of Testimonials, to be sent at once to T. W. JONES, Secretary, Etwall, near DERBY.

TO GAS MANAGERS.

THE Urban District Council of Newry require the services of a thoroughly qualified GAS MANAGER, to whom a Salary of £150 per Year will be paid to commence with, with Free House, Coal, and Gas.
Applicants must not be more than 35 Years of age, and must be thoroughly up-to-date in all matters appertaining to the Manufacture of Gas and the proper treatment of Residuals. Applicants to state when they will be prepared to take up duties.
Applications, enclosing *copies* of Testimonials, to be sent, on or before the 25th of July, to THOS. P. LEDLIE, Esq., Chairman of the Gas Committee, NEWRY.
July 11, 1902.

GAS ENGINEER AND MANAGER FOR DUNDEE.

THE Dundee Gas Commissioners invite Applications for their Vacant Office of GAS ENGINEER and MANAGER.
For proposed Salary and other Particulars apply to the undersigned.
Applications to be lodged with the undersigned on or before the 22nd of July next.
THOS. THORNTON, Town Clerk.
City Chambers, Dundee,
June 20, 1902.

COUNTY BOROUGH OF WIGAN.
(GAS DEPARTMENT.)

REQUIRED, a competent Sulphate MAKER. A man who is capable of doing general repairs on the Works when the Sulphate Works are not in operation preferred.
All Particulars may be obtained by writing to the undersigned.
References (not Testimonials) required.
J. TIMMINS, Engineer.
Wigan, June 24, 1902.

BOROUGH OF ABERAVON.

THE Council are prepared to receive APPLICATIONS for the position of COLLECTOR of GAS RENTALS, METER INSPECTOR, and GENERAL CLERK.
The person appointed must have a good knowledge of Book-keeping, and be thoroughly trustworthy. Age between 25 and 45.
The usual Bond of a Guarantee Society required.
Salary, 28s. per week.
Applications, accompanied by not more than Three *copies* of recent Testimonials, to be sent to me, endorsed "Clerkship," on or before the 19th of July inst.
Canvassing will disqualify.
By order.
M. TENNANT, Town Clerk.
Aberavon, July 9, 1902.

WOLVERHAMPTON GAS COMPANY.

WORKS SUPERINTENDENT.

WANTED, by this Company, a Works SUPERINTENDENT. Applicants must have a thorough practical knowledge of the Construction, Setting, and Working of Regenerative Furnaces, Inclined Retorts, and Elevating Plant, and must be accustomed to the control of Workmen and the general routine of Gas-Works.
Salary commencing at £200 per annum, with House, Gas, and Coal.
Applications, stating Age and Experience, with *copies* of Three recent Testimonials, to be sent to the undersigned on or before July 22, 1902.
P. G. WINSTANLEY, Engineer and Manager.
Gas Offices, Wolverhampton.

BOROUGH OF STOCKTON-ON-TEES.
(GAS DEPARTMENT.)

WANTED, a duly qualified Assistant GAS ENGINEER, who will be required to act under the direction of the Manager. The person appointed must be capable of taking full charge of the Works in the absence of the Manager.
Salary £300 per annum.
Applications, endorsed "Assistant Gas Manager," and accompanied by *copies only* of not more than Three recent Testimonials, to be sent to me on or before Twelve at noon, on the 16th inst.
Forms of Application and further Particulars can be obtained of the undersigned.
Canvassing a Disqualification.
ARTHUR B. CROSBY, Town Clerk.
Stockton-on-Tees,
July 3, 1902.

WANTED, Second-Hand Gas Plant, in good condition, as under—
Four PURIFIERS, 7 ft. or 8 ft. square, with Centre Valve, Connections, and Lifting Apparatus.
Four ANNULAR CONDENSERS, say, 12 ft. high and 14 in. diameter, with 6-inch Connections, arranged to couple up to existing Condensers, and Three 6-inch Valves.
EXHAUSTER and GAS-ENGINE, to pass 2000 cubic feet per hour, with Governor, Three 6-inch Valves, and Connections complete.
Tenders, giving full Particulars, to be addressed to H. ASHTON HILL, St. Augustine's Road, BIRMINGHAM.

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FOR SALE—Two 5 ft. square Purifiers, Four Layers Wood Grids, two 4-inch Four-Way Valves, and 4-inch Connections. In good working order. Tenders invited.
Apply to the GAS-WORKS, MABLETHORPE, S.O.

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GASHOLDER, 14 ft. by 10 ft. with 3 Columns and Suspension.
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GASHOLDER, 30 ft. by 12 ft. with 4 Columns.
GASHOLDER, 43 ft. by 14 ft. with 5 Columns and Suspension.
GASHOLDER, 45 ft. by 14 ft. with 5 Columns and Two Lift.
GASHOLDER, 80 ft. by 20 ft. with 10 Columns Two Lift.
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GASHOLDER and Cast Tank, 200,000 cubic feet capacity. Nearly new. Erected complete and guaranteed perfect for Half Price. Exceptional Chance and Bargain.
FIRTH BLAKELEY & Co., Thornhill, DEWSBURY.

CONDENSER for Sale—Morris and CUTLER'S "PERFECT;" capacity 250,000 cubic feet per 24 hours. In perfect condition. New in 1888, and recently retubed.
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TO BE SOLD—
10-inch SCRUBBER-WASHER, by Clapham, overhauled and perfect.
12-inch SCRUBBER-WASHER, by Holmes, overhauled and perfect.
FIRTH BLAKELEY, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

ON SALE—One Three-Throw Ram PUMP, belt-driven by Gas-Engine.
PUMP, Ram type, Pearn's make, 15-inches diameter 15-inch Stroke, fitted with Mortice Gear and brass-cased Rams and Glands. Will deliver 50,000 gallons per hour at 100 feet vertical Head.
GAS-ENGINE, 30 N.H.P. Crossley's make, complete, with Starter.
Further Particulars and permission to view may be obtained on application to Mr. T. MOLYNEUX, Water-Works Offices, St. Peter's Square, STOCKPORT.

FOR SALE or HIRE.—
30-h.p. Robey's PORTABLE ENGINE for 100 lb. pressure, done three months' work, latest type, new in 1901.
16-h.p. Marshall's do. for 90-lb. pressure, almost new.
14-h.p. Ruston's do. for 90-lb. pressure, almost new.
10-h.p. Marshall's do. for 80-lb. pressure.
8-h.p. Clayton's do. for 60-lb. pressure.
Immediate Delivery. Reasonable Terms.
WILLIAMS & SON, South Bermondsey Station, LONDON. Tel. 834 Hop.

BOROUGH OF SMETHWICK GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for the supply and erection of a CAST-IRON WATER-TANK, 44 ft. by 18 ft. by 4 ft. 9 in.
Also two WROUGHT-IRON ROOFS for Engine-House and Generator House, 22 ft. by 40 ft. and 34 ft. by 36 ft. respectively.
Detailed Drawings and further Particulars can be obtained on application to Mr. Vincent Hughes, Engineer at the Gas-Works.
Tenders, properly endorsed and addressed to the Chairman of the Gas Committee, to be delivered to the undersigned not later than Ten a.m., on Friday, the 25th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
W. J. STURGES.
Town Hall, Smethwick,
July 11, 1902.

URBAN DISTRICT COUNCIL, BOROUGH OF NEWRY.

TENDERS FOR GAS COAL.

THE Gas Committee of the above Council invite TENDERS for the supply of from 3000 to 3500 Tons of best screened GAS COAL (with quotation for unscreened Gas Coal at same time) for a period of Twelve Months, to be delivered in such quantities and at such times as may be required by the Committee, and to weigh 20 cwt. to the Ton over the Gas Committee's Weighbridge at their Works (said Machine is regularly inspected by Officer under Weights and Measures Act), and delivered *free ex* Ship or Steamer at Albert Basin, Newry.
The Coal to be Fresh Wrought, Dry, and Free from Hards, Smudge, Dirt, Shale, Pyrites, or other objectionable matter for Gas Making.
Further Particulars may be obtained from Mr. A. Gibb, Manager.
Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, and where raised, to be addressed to T. P. Ledlie, Esq., Chairman, and delivered to the undersigned not later than Eleven a.m., on Friday, the 18th of July.
The Committee reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender. They also reserve the power to decline acceptance of any Coal not equal in their belief to that contracted for.
ROBERT H. DOHERTY, Clerk,
Urban District Council of Newry.
New Town Hall, Newry,
July 4, 1902.